# MODEL AIRPLANE NEWS

MARCH 1954 35 CENTS

# Build that stunt job NOW!

**$5.95**

**Win those extra appearance points in spring competition . . . allow yourself time to add all the eye-catching details!**

## *National Champion* BARNSTORMER

Widely recognized as one of the nations top stunt models, the Guillow Barnstormer has emerged the winner of many state and local contests as well as heading the field at the '50 and '51 Nationals.

Designed by Lou Andrews – Champion Stunt Flyer

**BARNSTORMER SPECIFICATIONS**

Wing Span ..... 47 in.
Engine ..... .23 to .35 disp.

Completely prefabricated kit.

## *Baby* BARNSTORMER

Wing Span ..... 23½ in.
Engine ..... .035 to .049 disp.

**$2.95**

The ideal stunt ship for ½A enthusiasts. This "baby" will do all the stunts in the Book! Completely pre-fab.

## 4 GUILLOW CONTROL LINE STUNT MODELS

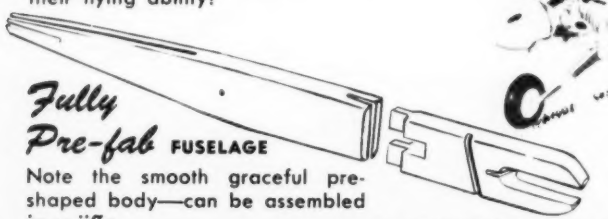
**FOR SPORT OR COMBAT FLYING**

**CLASS A · B**
Wing Span ..... 32 in.
Engine ..... .19 to .35 disp.
**$2.50**

**CLASS B · C**
Wing Span ..... 32 in.
Engine ..... .29 to .35 disp.
**$3.50**

## *Trixter* PROFILES

Be a winner in the control line circle with these smart appearing models. You'll be amazed with their flying ability!



## *Fully Pre-fab* FUSELAGE

Note the smooth graceful pre-shaped body—can be assembled in a jiffy.

Note: Engines and hardware not included in Trixter kits.

## *Mother and Dad*

These models make fine special occasion gifts for your son. Your hobby dealer can advise the proper model for his age and experience.

**GUILLOW'S FAMOUS**
FLYING MODEL CONSTRUCTION KITS 10¢ 25¢ 50¢ $1.00
DIE CUT SHELF MODELS 10¢ 25¢ 50¢

Available at your local model store or send direct to us adding 15¢ postage. Extra charge outside U.S.A. & Canada.

GUILLOW'S

# PAUL K. GUILLOW WAKEFIELD MASS.

# Gee! A Real Jim Walker FIREBABY!

**BIPLANE with *Super-charged* ENGINE**

The stunt plane every boy wants. Royal Spitfire engine with built-in Jim Walker "Supercharger" modification gives tremendous power response... instant starting... amazing fuel economy. Buy it ready to fly, complete with control lines, stunt flying instructions. All parts finished, painted and fuel-proofed. Span 19 in., weight with motor 4½ ounces.

**READY TO FLY**

**$9.75**

With engine

Without engine $3.50

## POPULAR A-J ACCESSORIES

**FUEL REGULATOR**

Supplies fuel under pressure until tank is dry Pressure tank included. **$2.50**

**U-REELY CONTROL**

Keeps flying wires neat, ready for use. With stranded cable control lines. **$8.50**

## Famous A-J Ready-to-Fly Planes

**A-J INTERCEPTOR • 50c**

**"74" FIGHTER • 10c**

**A-J HORNET • 50c**

**CEILING WALKER • 25c**

*Wherever Model Planes are Sold*

Jim Walker

**A-J AIRCRAFT CO.**

PORTLAND 12, OREGON, U.S.A.

# MODEL AIRPLANE NEWS

*25th Year of Publication*

MARCH 1954 Vol. L—No. 3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by William Winter

Now that the rising costs of eggs and bacon have finally compelled MAN to go to 35¢ a copy, it is time for a little man-to-man talk about your magazine, and what the staff plans for the future. It is also an opportune time to chew over a few problems with you, and to invite your advice on model matters.

Magazines in this field have taken different courses of action to adjust to present conditions, as magazines in numerous fields have been compelled to do. The average rate of profit in the magazine business is extremely small, especially when compared with 20 years ago. When material and production costs go through the roof, magazines may decide to give the reader less for his money, increase their price and/or their advertising rates, and many have done all these things. In recent times, in our own field, we have witnessed a price increase on the part of one competitor, a decrease in the number of pages by another. We will see expansion to include other types of material. MAN wishes them well.

In its own future policy, MAN is going straight on down the middle. As the model airplane builders' magazine, we're more conscious than ever, in these fluid times, of what is expected of us—namely, to provide a rallying place for model plane hobbyists. To do this, MAN will continue to publish the best material, the most authoritative articles, the most proven designs that can be squeezed between two covers. Despite recent announcements to the trade by a competitor who will do otherwise, MAN will not publish material that does not belong in a model plane magazine.

Over the past few years, there has been put together a team of the world's top contributors. Far from becoming dependent on the eastern part of the country, MAN has encouraged talent from all over (*Continued on page* 8)

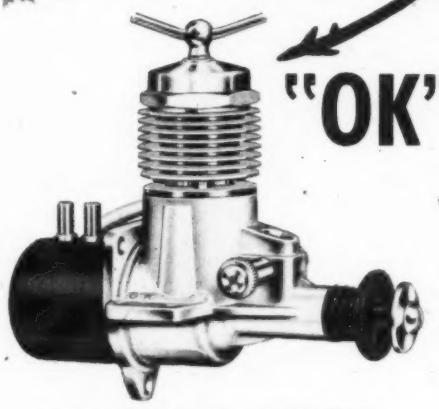
PLANE ON THE COVER

*Still flying today under conditions that thwart more design transports, the Ford Trimotor, or famed "Tin Goose," goes back to 1927, when a single engine design dating from 1925 evolved into the three 200 hp Whirlwind job known as the Stout AT-4. Developed especially as part of Henry Ford's dream of practical airline operations, the Tin Goose underwent considerable improvement, operating on transcontinental routes until the first of modern transports, Boeing 247, took over.*

NEXT MONTH'S COVER

*Pictured in all its futuristic significance by artist Jo Kotula, the superswift Douglas F4D Skyray enhances the April issue. This is the machine that, on October 3, averaged a blazing 753.4 mph in official measured speed runs to set world record. So far equipped with J-40 turbojet with afterburner, production jobs will have even more powerful installations. Developed for Navy.*

# World's FIRST Shock-Proof DIESELS



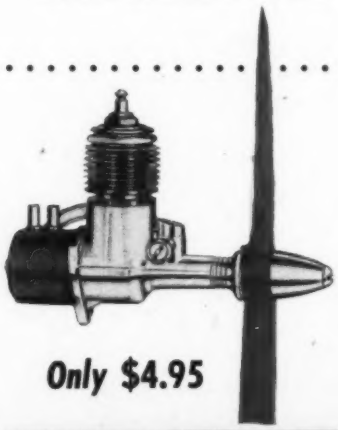
## "OK" CUB .049 DIESEL

Disp.: .049 cu. in. or .83 cc.
Height: 2 7/16"
Weight: 1½ oz., including fuel tank

***Also* — "OK" CUB .075 DIESEL** Disp.: .075 cu. in. or 1.25 cc.; Height: 2⅝"; Weight: 2 oz., including fuel tank ..... $7.50

Both the .049 and .075 Cub Diesels include radically new and improved features which enable these rugged little power plants to "roll with the punch." Exclusive shock absorber pad and pulsating contra piston (patents pending) minimize impact stresses . . . protect running parts against premature failure.

"OK" Diesels require no ignition accessories — no batteries . . . no plugs . . . no harness . . . no connecting clips. All you need is "OK" Cub Diesel Fuel. Your dealer has all the exciting details on these revolutionary new "OK" Diesels — check with him, or write direct.



Only $4.95

## "OK" CUB .049B

Maximum output at higher RPM. Extended prop mounting permits easier, safer fuel adjusting. Sold complete with fuel tank, glow plug, propeller and spinner.

Disp.: .049; Bore: .420; Stroke: .360

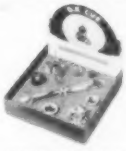
## For PRICE, POWER, and PERFORMANCE

17TH ANNIVERSARY OK 1937 1954

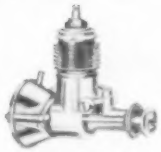
A Complete Line of PROVEN Miniature Engines and Accessories

"OK" GLOW FUEL
"OK" DIESEL FUEL
Pint 85¢

"OK" GLOW PLUGS
Short or long — 59¢



"OK" CUB .049
POWER KIT
"Assemble-it-Yourself"
$4.95



"OK" CUB .049X
Combination Pkg.
$5.75

"OK" CUB .074
$5.95

"OK" CUB .099
$6.95

"OK" CUB .14
$8.95

"OK" HOTHEAD
$10.95

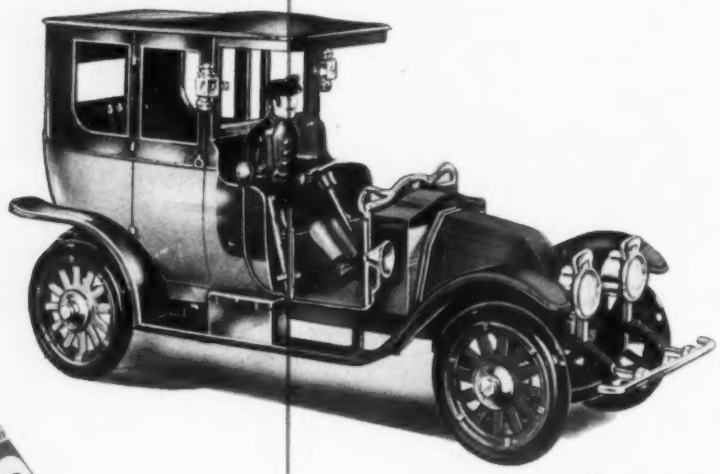
"OK" COMBINATION PACKAGES

CUB .074 ..... $6.75
CUB .099 ..... $7.75

# HERKIMER TOOL & MODEL WORKS

88 Harter St. Herkimer, N. Y.

# It isn't finished until it's painted!



*For ALL plastic kits and toys and many housewares.*

*Basic Color Kit 69¢*

*New Complete 12-bottle Kit with thinner, brush and cement 98¢*

## *PACTRA C-MENT*
### *in the new long-nose tube*

**Build** it with PACTRA C-ment, the non-running, stronger-bonding adhesive **for all plastic kits!** Only PACTRA'S C-ment has **controlled adhesion** for better fitting of long surfaces. The new ½-ounce long nose tube is designed for quick, easy application to small kit parts. Ask your dealer for C-ment **in tubes** ...

## *PACTRA 'NAMEL*
### *the Perfect Paint for ALL Plastics*

**Paint** it with PACTRA 'Namel, the non-etching, non-crazing finish **for all plastics!** See it now at your dealer's in both the 69¢ Kit—and **new** 98¢ 12-bottle COMPLETE FINISHING KIT, with C-ment for plastics, thinner, and a brush, plus new Wood Tan, Flesh and Green colors. Your **biggest** hobby paint "buy".

**pactra**
**CHEMICAL CO.**

**1213 No. Highland Ave., Los Angeles 38, Calif.**

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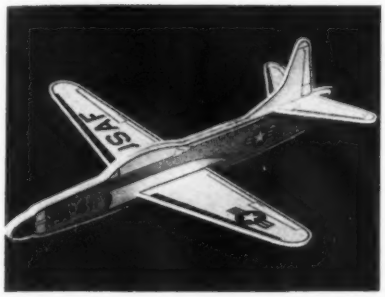
Northwestern Railroader Kits
Bonnie Bilt Early Americana
Revell Authentic Kit Planes
Revell Authentic Kit Boats
Allyn Sales Airplane Kits
Pyro Plastic Ship Models
Gowland Shipyard Kits
Lindberg Plastic Scale Models
Revell American Firefighters
Frontier Early Western Kits
Bachman Plasticville Kits
Hawk Model Plane Kits
Miniature Masterpieces
Ace Products Auto Kits
Revell Highway Pioneers

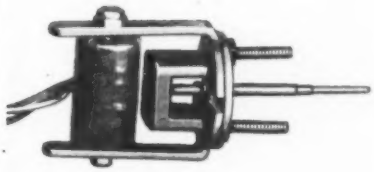
# TRADE SHOW

**MONTHLY REVIEW OF NEW PRODUCTS, OTHER INTERESTING ITEMS WORTH ATTENTION**




▸ *Flash-Bilt Starfire:* Younger readers will find interesting this hand-launched or rubber-sling catapulted glider, one of series of six famous fighters (25¢ each) by Comet Model Hobbycraft, Inc., Chicago, Ill. All balsa, printed in two colors, fully die-cut. Wing spans vary between 9 and 12 in.

▸ *Clockwork Timer:* Reliable timer for testing radio control models, for dethermalizer action, engine cut-off, made by E. D., England, distributed in U. S. by International Hobbies, Albuquerque, N. Mex. For operation in 0-45 second range, may be modified to 0-25, or up to 0-90. Lists at $2.50.

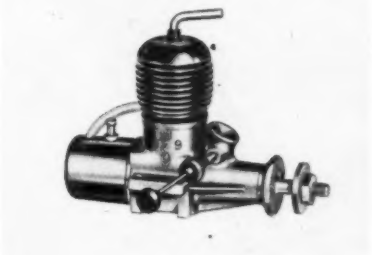


▸ *Magnetic Actuator:* For proportionate rudder control of radio models, has magnetic rotor which pulses in neutral, uses variations in pulsed signal for any degree of left or right. Weighs 1-1/2 oz., takes up to 6 volts. No sequence of operation, or rubberband. M. S. Adams Co., Janesville, Wis.

▸ *Flying Cloud:* Wakefield kit deluxe, by Berkeley Model Supplies, West Hempstead, N. Y. Kit includes hardware – parts for hinged blade assembly, formed gear and

shaft; silk for fuselage covering, and a carved prop. This noteworthy item should not be confused with machine cut props. Optional gear installation is detailed. Span 51 in. Priced $3.95. Design by Henry Struck.

▸ *McCoy "9" Diesel:* Similar in appearance to the smaller McCoy .049 Diesel, is the first American Diesel in this popular size. The bore is .526, stroke .460, weight 3 oz.

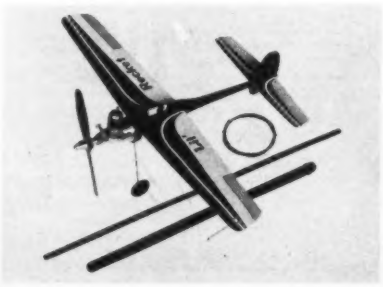


Has familiar red anodized head and includes the tank. Being a high speed Diesel, the "9" is suited to controlline, free flight, or radio model usage. By McCoy Products Co., Culver City, Calif. The list price is $7.95.

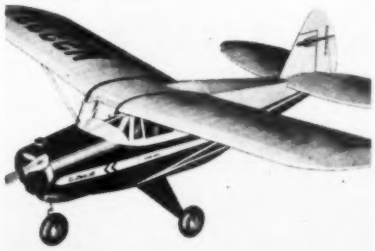
▸ *Revell Starfire:* Plastic Lockheed F-94C, by Revell, Inc., Venice, Calif., is latest addition to firm's other plastic fighters: Chance Vought Cutlass and Grumman Cougar. Each

is priced at 59¢; the trio as special gift package, $1.79. No cutting, sanding or carving required; requires only cementing and decorating. Detailing is complete to 24 radar-controlled rockets in a special nose.

▸ *Lil' Rocket:* Intended for inexperienced modeler, or fun, ready-to-fly model ($7.95 with engine), features shock resistant plastic fuselage, fuelproofed plasticized balsa wing, tail, Kaysun prop, aluminum spinner, and .0398 Cub engine. Flown single line. Victor Stanzel & Co., Schulenberg, Tex.



▸ *Sterling's Scale RC:* Especially designed for radio work, this 58 1/2 in. Piper Tri-Pacer also works out well as controlline "goat" or free flight sport. Witnessed flights indicate realistic, docile performance on K & B .19. Parts, plywood, die-cut and shaped. By Sterling Models, Philadelphia, Pa. List, $10.95.



▸ *Hypo Oiler:* Bench-type oiler, polyethylene squeeze bottle in two sizes: Hypo-25, 2 oz. capacity, $1.25; Hypo-49, larger needle, $1.30. Small hypodermic needle version for fine oiling; larger for cements, glues, solvents, as well. Plastic cap protects needle when idle. Gaunt Industries, Chicago, Ill.

# ... the HOBBYIST'S SUPERMARKET of SUPER SAVINGS!

**NOWHERE IN THE WORLD** will you find as large a selection of AIRPLANES • ENGINES • SPEEDBOATS RACE CARS • ACCESSORIES • ETC. **CHECK THIS LIST!**

## LOOK! Only AHC Gives You All These Terrific EXTRAS

1. One year subscriptions to Model Airplane News, Air Trails and Flying Models or their equivalent value to our regular customers.
2. 14-Day Money Back guarantee on unused purchases.
3. Sensational BONUS with every gas engine purchased! 50 ITEMS WORTH OVER $7.00 FREE OF EXTRA COST. See box below.
4. BONUS with gas planes! 12 ITEMS WORTH $3.50 FREE OF EXTRA COST. See box below.
5. No postage or packing charges for orders of over $1.00 (include 25c if order is under $1.00). We insure safe delivery ANYWHERE IN THE WORLD. Outside of U.S.A. (except APO & FPO) add 10% for postage (minimum 50c).
6. Membership in "Modelcrafters of America," the club that keeps you up to date on gas modeling and SAVES YOU MONEY ON YOUR PURCHASES. Over 100,000 members!
7. No "minimum" orders. Any order is welcome.
8. 24-hour service. Mail addresses in Chicago, San Francisco, Denver and New Orleans airmail your orders to our N. Y. office for immediate shipment to you.
9. Most complete model stock in America—gas, rubber, solids, etc. If it's advertised, we can usually supply it.
10. Competent understanding of your modeling problems.
11. 128-page giant 2-color illustrated catalog FREE with every order.

## AIRPLANES

### FREE-FLIGHT PLANES

| | |
|---|---|
| Baby Zephyr 28" AA | .98 |
| Badger 72" A-B-C | 5.95 |
| Beaver 44" AA | 2.95 |
| Bird Dog 36" FF AA | 2.95 |
| Bootstrap 40" AA | 2.50 |
| Buccaneer 8 Special 54" B | 3.95 |
| Champion 36" A-AA | 2.50 |
| Clipper 34" AA | 2.50 |
| Cloud-Coaster TR 25" AA | 3.50 |
| Cloud-Coaster D 36" AA | 2.95 |
| Commerald 36" AA | 2.75 |
| Dakota 24" AA | 2.50 |
| Folly 32" Aeron 20" AA | 1.75 |
| Fu-ber 36" AA | 1.79 |
| Fu-ber 65 65" B-C | 6.95 |
| Hawk 27" AA | 2.50 |
| Helicoplane 39" AA | 3.95 |
| Jesco Bird 44" AA | 2.95 |
| Jesco Streak 32" AA | 1.98 |
| Junior Phoenix 36" A | 2.25 |
| KIWI 38" AA | 3.50 |
| KIWI 44" A | 4.80 |
| KIWI ABC 61" A-B-C | 6.95 |
| Lift Master 34" AA | 2.25 |
| Lil Rascal 27" AA | 1.50 |
| Luscombe Sedan 76" C-D | 7.50 |
| Mini-Hogan 34 34" AA | 1.95 |
| Mini-Hogan 40 40" AA | 2.95 |
| Navajo 36" AA | 2.50 |

**Buried in This Ad**

are most of the new items. Sometimes there isn't time or space to list all of them. But, if available anywhere, we have it.

| | |
|---|---|
| PAA Master 35" AA | 2.50 |
| Pacemaker 40" AA | 2.95 |
| Phoenix Flash 32" AA | 1.78 |
| Phoenix Skipper 34" AA | 1.98 |
| Powerhouse 32" AA | 1.78 |
| Powerhouse 41" A | 2.95 |
| Powerhouse 56 18" B | 5.95 |
| Privateer Flying Boat 36" FF AA | 2.95 |
| Profile Powerhouse 24" AA | .60 |
| Sandy Hogan 72" B-C | 8.95 |
| Shadow 32" AA | 1.98 |
| Sioux 36" AA | 1.98 |
| Skylark 31" AA | 2.00 |
| Sniffer 27" AA | 1.98 |
| Super Brigadier 50" B | 4.95 |
| Taylor Cub 35" AA | 2.95 |
| Tenk 21" AA | 1.50 |
| Zoot 33" AA | 2.50 |
| Zoot 50" A-B | 4.98 |

### RADIO CONTROL PLANES

| | |
|---|---|
| Piper Tri-Pacer 39" A-B-C | 10.95 |
| Bootstraps "A-RC" 54" AA-A | 3.95 |
| Brigadier RC 38" AA-A | 1.95 |
| Kenhi Buzzard 72" A-B-C | 10.95 |
| Kitten 36" AA | 3.95 |
| Livewire RC 48" AA | 4.95 |
| Livewire Sr. 65" A | 14.95 |
| Buccaneer 8 Special 54" B | 3.95 |
| Buccaneer 8 Special 72" C | 7.95 |
| Super Brigadier 58" B-C | 6.95 |
| Super Buccaneer 90" C-D | 14.95 |
| Custom Cavalier 108" D-E | 17.50 |
| Luscombe Sedan 76" C-D | 7.50 |

### U-CONTROL PLANES

| | |
|---|---|
| A-2 Twin 25½" AA | 2.98 |
| Aeronca Sedan 38½" A-B-C | 4.95 |
| Aeronca Sedan 22" AA | 1.98 |
| Aeromite 11" AA | 4.98 |
| Air Racer 18" AA-A | 1.49 |
| All Amer. Trainer 21" AA | 1.78 |
| All Amer. Stunt Trainer 26" A-AA | 2.80 |
| All Amer. Stunt 36" A-B | 4.95 |
| All Amer. Sr. Stunt 81" B-C | 9.95 |
| Baby Bernstormer 23" AA | 2.98 |
| Baby Clown 22" AA | 1.60 |
| Baby Ete 18" AA-A | 2.60 |
| Baby Ete Bipe 16" AA | 2.50 |
| Bernstormer 42" A-B | 5.95 |
| Bearcat, Jr. 20" AA-A | 1.50 |
| Bearcat 28" C-D | 6.98 |
| Beechcraft 16" AA-A | 2.95 |
| Bel-Air 18" AA-A | 2.95 |
| Blue Stunt Train 22" B-C-D | 3.95 |
| Boeing P-26A 17½" AA | 2.98 |
| Boeing P26A 18" AA | 2.98 |
| Brave 15" A-B-C | 3.98 |
| Cat's Whiskers 40" A-B-C | 3.95 |
| Cessna 22" AA | 1.98 |
| Cessna 36" B-C | 5.95 |
| Chief 53" B-C | 6.95 |
| Circus Kings 40" B-C | 4.98 |
| Combat Sky Box 36" A-B | 2.95 |
| Corsair 17" A-AA | 2.98 |
| Curtiss P40E 20" AA | 3.98 |
| Curtiss Hawk P&E 27½" AA | 2.95 |
| Curtiss Hawk P&E 23½" A | 4.98 |
| Dynamic 26" A-B | 3.50 |
| Fire Baby 19" AA | 2.50 |
| Fireboby (incl. Engine) | 7.88 |
| Fireboby Biplane 19" AA | 3.50 |
| Fireboby Biplane (incl. engine) | 9.75 |
| Flip-Flop 24" A-B | 3.50 |
| Flying Clown 28" A-B-C | 1.95 |
| Focke Wolfe 190 17" AA | 2.98 |
| Folster D-VII 32½" U/C A-B-C | 5.95 |
| Great Lakes Trainer 27" A-B | 4.95 |
| Good News 30" A-B-C | 5.95 |
| Guided Star 26" A-B-C | 2.50 |
| Guided Starlet 24" AA-A | 2.75 |
| Heli—Razor 9" AA | 2.00 |
| Heli—Razor 14" A | 5.95 |
| Heli—Razor 15" B | 6.50 |
| Heli—Razor 18" B-C | 6.95 |
| Hummerd 36 20" AA | 2.98 |
| Howard Pete 30" B-C-D | 5.95 |
| Imperial Hogan 20" AA | 1.98 |
| Junior Stunt 9 27" AA-A | 2.49 |
| Junior Stunt 19 34" A | 3.98 |
| Junior Stunt 29 40" B | 4.98 |
| Kenhi Panther 48" B-C | 6.95 |
| Kenhi Wildcat 37" A-B | 4.95 |
| Kenhi Bobcat 37" A-B | 3.95 |
| Kenhi Cougar 51" B-C | 6.95 |
| Kenhi Mustang 48" B-C-D | 6.95 |
| Key 29" B-C | 5.95 |
| Knockout 18" AA-A | 2.50 |
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| Cameron .09 Marine | (A) | 6.50 |
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| Forster F.31 Glo | (C) | 11.20 |
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| McCoy 29 R.H. | (B) | 14.95 |
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| O & R 33 Glo | (C) | 13.95 |
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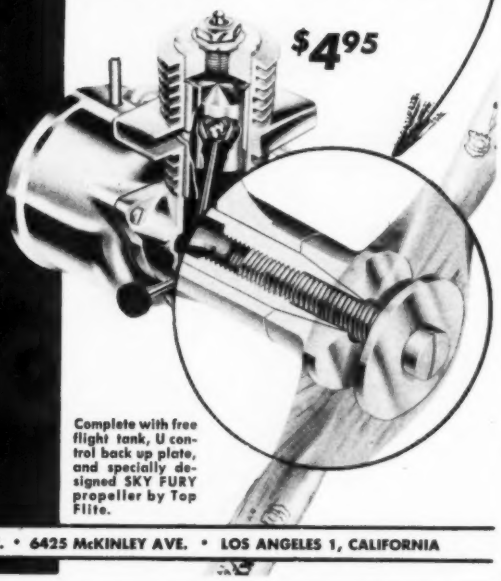

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## Man at Work

(*Continued from page 2*)

the nation and the world. More noteworthy regular contributors include people like E. C. Martin from Canada, who has been approached by four engine manufacturers who would like his talent on their staff; Peter Chinn, versatile analyst, who knows as much about modeling in many lands as he does in his own England; Jo Kotula, aviation's most widely known artist, whose commercial art you see in national advertising, whose plane illustrations appear in national slicks, and whose wonderful plane covers, both old and new, appear on MAN covers exclusively; E. J. Lorenz, who has forgotten more than most people have learned about model airplane radio. With a million bucks to spend, it would be impossible to offer better men than these. Occasional contributors of designs have included famous names as Keith Storey, Harold deBolt, Les McBrayer, Jim Saftig, Bob Palmer, Lew Mahieu, Walt Musciano, Jim Moynihan, Ron Warring, Bill Dean, George Aldrich, Ken Willard, and a host of others. If you want to go back, anyone who ever meant anything has been published in MAN.

* * *

▶ In the forefront of editorial considerations is the beginner problem. This is an oldie, as you know, customarily "taken care of" by a series of progressive models, seemingly designed on the theory that pa knows best, and that fun is verboten. Seems to us that, if the small fry are going to keep going, they will demand more than this. Of course, learning the fundamentals is essential, but can't this be done in a sugar coated way, automatically, when they build flying saucers, profile Super Sabres and the like? MAN has a group of 10,000 readers among its subscribers whose average age is 13 1/2. This is phenomenal for any model magazine. MAN is planning new type presentation of articles and construction projects to begin appearing by Spring; it takes that long to work out the myriad details. What is your advice?

Another aspect is the publication of articles about various plans of action successfully applied in various cities, on the theory that many other communities are looking for just such solutions to their problems. Some day, it may be hoped, the Model Industry Association will be able to implement an active promotional program along this line. So far it appears that MAN is the only publication giving major space to this worth while need; examples: Clinic That Clicked in the February issue, or the Boston Program in January. Do you think we are on the right track? Please tell us!

Then there is the flying site problem, an acute headache if there ever was one. Suburban housing gobbles up open areas. Modelers go farther and farther to fly, but fewer people are able or willing to travel so far. Kids can't do it at all. Noise brings down on U-controllers the ire of neighbors. Lack of space inhibits free flight. What should be done? Publish solid scale models? Encourage small planes? The suppression of noise? Publish successful case histories—how the modelers gained and kept the support of the Town Fathers? Why does one town say nix, and the next say fine? Here's a real need for a putting to the wheel the shoulders of everyone concerned, including the industry. Any suggestions? We need your help.

* * *

▶ What kind of free flight models should MAN publish? Is Half-A the thing? Is it scale and sport? Right now we are trending toward sport and scale stuff, for .049's and .09's, with an occasional A to C contest job thrown in. How does this sit with you? What would you do?

In controlline, every survey indicates an

overwhelming preference for scale, and then stunt. Casual interest in team racing and speed. But as a rule, younger readers can't build and operate the big-engined stunt and scale jobs. And when a fine finish may cost anything up to seven bucks, how many builders need something simple? The real beginner can manage a Half-A profile, and that fits his pocketbook, but bigger jobs take off and land better, don't break as many props. What have you found? What do you think we should do?

In radio, cost is the big consideration. But many want multi-controls. The guys who broke in want something new in ships, low wings, bipes, racers, etc. Beginners, whose number is always legion, require simple, foolproof designs, if there is such an animal. Small ships, big ships? How about the many builders who also like boats? Should we run boats? After all, this, too, is radio control. And for the gadgeteer, more articles on tricky ways to get more controls cheaply? More receivers and transmitters? On the whole, MAN has been inclined to publish a radio only when there was a need for it, such as the Lorenz and Miller (which got us going on hard tubes). One transmitter will be published in the near future, because builders of homemade stuff think we should have one available. What do you radio fans want to see? Won't you speak up?

There's periodic small interest in indoors. But indoor models are about as suitable for the average hall as a 24-foot free flight is on a football field. Encourage new forms of indoor flying, radically new and simpler designs? Or do nothing? Do you think indoors can be saved? Is it worth saving? Why don't *you* build indoor models? The long haired theory boys want stuff that. the rule of thumb guys consider hog wash. Do you recommend that we run theoretical articles?

• • •

▶ Have always been awed by the "amazing coincidence." Probably the oddest occurred when a column we edited happened to describe an incident in the first World War, where an Allied two-seater was badly shot up. The pilot was killed and the observer unconscious. The machine flew back to France, ran out of gas and made a good landing in a field. Many years after the event, when the column appeared, a man wrote in to prove that he was that observer. Similarly, the other day. A young fellow came into the office with a copy of the January MAN with the Curtiss Helldiver cover. His father had been the test pilot of that very machine—had the serial number cut from the rudder to prove it. Also a letter from Rear Admiral Moffett, lost long ago in the crash of the airship Akron, in the Atlantic, which told how he had prayed for the pilot of the Helldiver when it shed its wings. The pilot got out—that time.

"What's your name?" we asked the fellow. "Darr Collins," he replied. "My father was Jimmy Collins." Remember when Jimmy Collins was the world's most famous test pilot? The days of the 9G pull-out, when it was even money you didn't? Even money it was, for a Grumman bipe fighter afterward shed its wings over Farmingdale and Collins rode it in.

Somewhat subdued by this outcome of the January cover, opened a package from Jim Moynihan which contained the plans for the Vought Sikorsky Kingfisher, featured this issue. Deciding that a real picture would round it out nicely, dug into the file, and found the shot that graces top of page 12. Note that it is the same airplane as Jim modeled, No. 303, from the Battleship Mississippi. And 10,000 of those jobs were built! And that picture had been taken by old friend Rudy Arnold, whose credit line is a by-word in aviation and who took for MAN two model airplane kodachrome covers published a year or two ago.

• • •

▶ This eerie feeling of destiny often enters into arrangements for new designs for publication. In the write-up of the last Nationals, recounted watching an engine-in-wing pylon vanish straight up with stuek timer. In Roxbury, Mass., Sears McCorrison read this and sent in a picture he had taken of that ship on the same flight. Yours truly not appearing, asked if the enlargement included us. Sure did—there was MAN at Work, hard at work. So Sears mentioned that the design stemmed from a Folly design by Phil Boynton, formerly of Wenham, Mass., it in turn (he thought) being based on a layout by Bill Dean, right after the war. Still another chap, Paul Donnoffio, did further research on the Folly idea and had a three-view in Zaic's Yearbook. McCorrison, who had flown them with success, volunteered to find out who had really worked up the design so that MAN might be able to publish the plans. After he reached as far as Lee Renaud, well known New England Wakefielder, Lee filled in the picture.

Phil Boynton laid out the design on a carrier in the Pacific. He flew it during 1945 and '46 and racked up wins in all classes. Then Donnoffio picked up the idea and won many contests, walking away from competition during 1949 through 1952. Danny Sobola, Paul, Bill Dean, and Renaud all had outstanding luck with the Folly. But the designs were too small for the new hot engines, though Bill Dean flew one with a Fox .35 at the Nats. Just when his timer stuck, MAN walked on the scene. When Sherlock Holmes reports his findings, we hope to run the design. More than one—many more — designs published in MAN are obtained in this fashion. Feel haunted?

END


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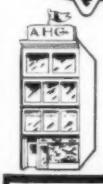

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Authentic markings indicate our miniature Kingfisher was flown by the section leader, Airplane Four, Observation Squadron Three (VO-3), aboard battleship Mississippi. Scale: inch-foot.

# The Kingfisher

By JIM MOYNIHAN

***Build scale? Fly for sport? Carrier event? This man's size model of one of the most colorful planes of World War II flies as well as it looks. For .29 to .35 engines.***

Much like Dumbo, the Catalina flying boat, the Vought OS2U-1, was designed for one thing and wound up its service career having done nearly everything. Many are the Navy veterans who lived to go on fighting because they were "Kingfished" out of the briny by this airplane. Unsung, it hit the front pages with rescue of Eddie Rickenbacker from the Pacific wastes. But the topper was the time a Kingfisher landed in Truk harbor, Japan's Gibraltar, in the middle of a big raid and loaded seven downed Navy pilots on wings and floats, taxied 16 miles through the ocean's open water to deposit them safely with the submarine Tang, then flew back into action.

Small, rugged and versatile, the Vought OS2U-1 was among the first airplanes to use welding extensively in its structure. Note too the use of spoilers for lateral control at low speeds when the ailerons dropped with the flaps on landing runs. Powered by a 450 hp Pratt and Whitney radial, it was no ball of fire, but in 1941 it was an airplane when we needed airplanes. Originally brought out in 1939 as a gunnery spotting and observation plane for catapult fleet duty, it stayed in service until 1944, and in some cases later, fianlly bowing to progress in the form of the helicopter.

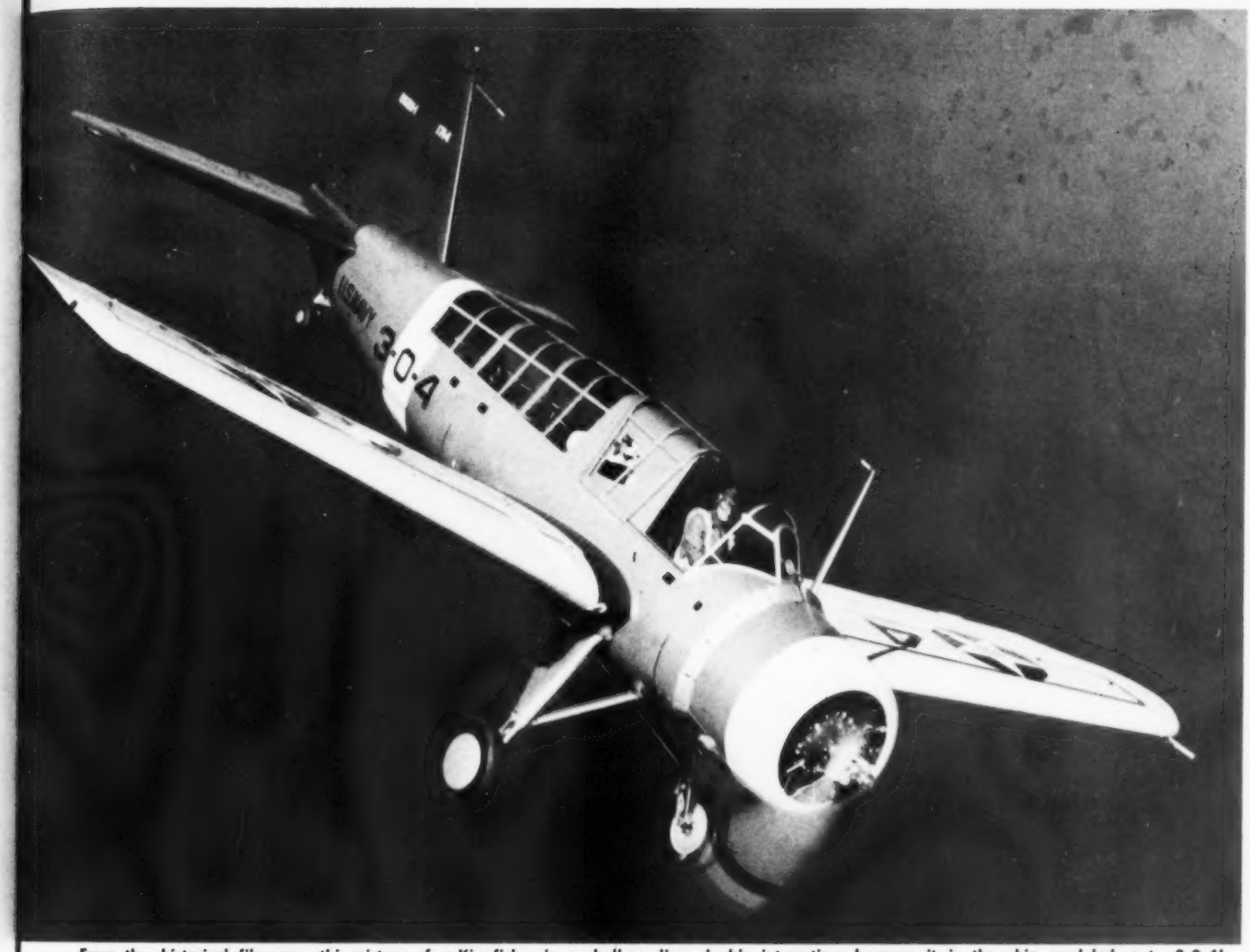
The drawings are scaled directly from Vought Sikorsky Co. prints: one inch to one foot scale. The markings shown are authentic, pre-war and colorful. This ship represents the machine flown by the leader of Section One, Airplane Four, Observation Squadron Three (VO-3), aboard the 33,000 ton New Mexico Class battleship, the Mississippi. When shore based, the wheel gear shown replaced the usual single large float and the two wing tip floats.

Getting down to the business of building, it would be best to read the details carefully since this ship was designed to be built with the engine mounts, gear, wing spar and hook all in one beefed up unit, and while construction is not difficult, the wrong sequence of construction can make it awkward. With the demands of the carrier event placing a premium on ruggedness, low speed control and short field take-off, we think this ship will please the most critical fan.

Build the wing first. It is conventional in construction, using two spars of hard balsa helped out by plywood short spar gussets as indicated on the drawings. The spars and plywood spar stiffeners extend right through and key in between the engine mounts later. Plank the wing

Typical of older aircraft, the Kingfisher has relatively large wing area, making it a fortunate choice for controlline use, especially where slow speed flying and landing are important.

Little details, pilot, loop antenna, opened cowl flaps, add realism, yet essential simplicity of the real craft minimizes fussing. Fixed gear is a welcome relief from modern single struts.




**From the historical file came this picture of a Kingfisher in a shallow dive, doubly interesting because it is the ship modeled—note 3-0-4!**

with 1/16 sheet, butting up to the balsa leading edge and lapping over the wing tip and lapping about 1/4 in. to form the trailing edge. The spars and stiffeners will fix the dihedral. Be sure to leave open the skin in the center section to allow positioning the wing. The bottom surface skin can be left on. Cover the unit with silk or Silkspan after sanding.

The tail is simple since the tail assembly is cut entirely from 3/8 soft sheet. Allow a 1/4 in. offset on the rudder. The elevator hinges we use are simple and foolproof. Cut strips of metal shim stock of brass or steel about 3/8 wide and 1 1/2 in. long. Pick out a piece of wire about 1/32 in diameter and bend the metal strips around the wire, pinching them at the wire to make them conform closely to the wire diameter size. Push these strips into stab. and elevators and cement. Now use the next smaller wire size as a hinge wire. If this is done properly, the elevators will droop of their own weight and will not be affected by dope. Exhaust from the engine only serves as lubrication. The rest of the tail assembly data is shown well on the drawings.

The fuselage is built swiftly and easily if done in the right sequence. As we mentioned previously, the beef in the ship lies in the engine mount-wing-spar-gear-hook basic unit. To achieve a high strength to weight ratio, we key the parts into a sort of interlocking frame, so stresses applied to any member part of the unit are transferred to all parts.

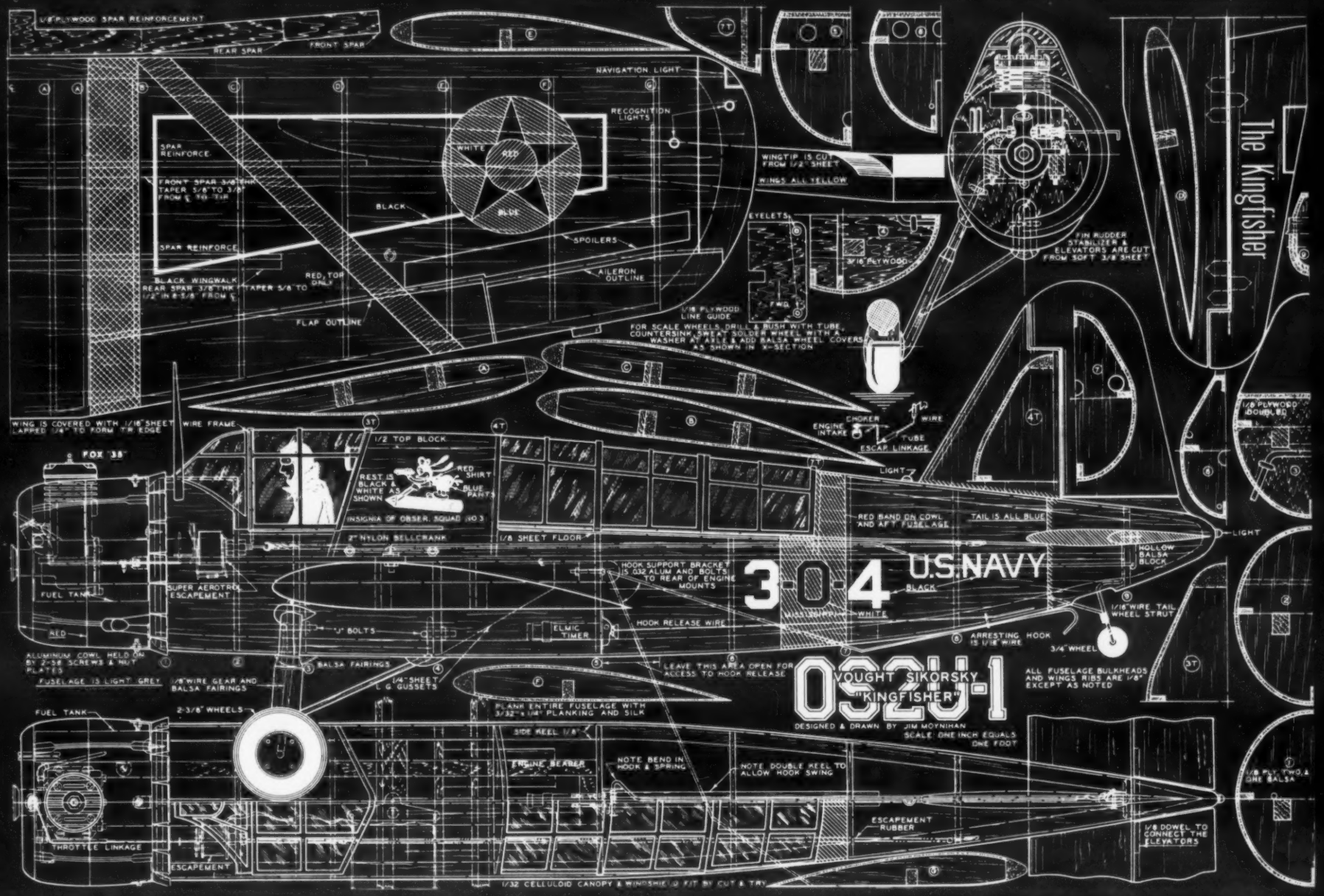
Do it like this: cut out the fuselage bulkheads, and side, bottom and top keel pieces. Carefully line up the engine beam mounts (preferably of maple) and cement them together at the hook point of attachment. Add bulkheads one through five. Now make up the arrester hook assembly and drill the mounting holes through the bracket and the maple piece connecting the engine mounts at the rear for No. 2-56 bolts, but don't mount the unit yet. Incidentally, when it is mounted, be sure to use washers under the bolt heads.

Now add the side longerons and the remaining bulkheads. Turn it upside down on a flat surface and add the bottom keel to the remaining bulkheads. Let this dry and add a few strips of planking to beef up the unit for handling. Turn it over and add the top keel and let dry. Now bend up the landing gear frame and drill the bulkheads for J bolts but don't mount the gear yet. Mount the wing,. stabilizer, and then the main and tail wheels. Now mount the hook, timer release and bellcrank. Finish planking up the bottom and add the power control device.

We used a Super Aerotrol escapment with linkage of the old RC rudder type to the engine choke, a small piece of sheet steel sized by the "try it this way" method. A relay type control to a fuel bleed· line will work just as well, although we like this escapement because one pulse of the battery is all that's needed, instead of the continuous pressure and battery drain of the relay type. Add the rubber bands for the relay, and finish planking. We sealed it all up to keep fuel and exhaust out but you can easily put in a team racer latch and make the front cockpit assembly removable. Be sure to wire up your control device to the bellcrank leads and be equally sure to use a non-metallic (*Continued on page* 51)

SEE PLAN ON NEXT PAGE

FULL SIZE PLANS AVAILABLE. SEE PAGE 49.


1/8 PLYWOOD SPAR REINFORCEMENT
REAR SPAR
FRONT SPAR
NAVIGATION LIGHT
RECOGNITION LIGHTS
WHITE
RED
BLUE
BLACK
SPAR REINFORCE
FRONT SPAR 3/8" THK TAPER 5/8" TO 3/8" FROM ℄ TO TIP
SPAR REINFORCE
BLACK WINGWALK
REAR SPAR 3/8" THK TAPER 5/8 TO 1/2" IN 8 3/8" FROM ℄
RED, TOP ONLY
FLAP OUTLINE
SPOILERS
AILERON OUTLINE
WINGTIP IS CUT FROM 1/2" SHEET
WINGS ALL YELLOW
EYELETS
3/16 PLYWOOD
1/16 PLYWOOD LINE GUIDE
FOR SCALE WHEELS DRILL & BUSH WITH TUBE, COUNTERSINK, SWEAT SOLDER WHEEL WITH A WASHER AT AXLE & ADD BALSA WHEEL COVERS AS SHOWN IN X-SECTION
FIN RUDDER STABILIZER & ELEVATORS ARE CUT FROM SOFT 3/8 SHEET
The Kingfisher
WING IS COVERED WITH 1/16" SHEET LAPPED 1/4" TO FORM T.E. EDGE
WIRE FRAME
CHOKER
ENGINE INTAKE
WIRE
TUBE
ESCAP LINKAGE
1/8 PLYWOOD DOUBLED
FOX 38
1/2 TOP BLOCK
RED SHIRT
BLUE PANTS
REST IS BLACK & WHITE AS SHOWN
INSIGNIA OF OBSER. SQUAD NO 3
2" NYLON BELLCRANK
1/8 SHEET FLOOR
LIGHT
RED BAND ON COWL AND AFT FUSELAGE
TAIL IS ALL BLUE
LIGHT
HOLLOW BALSA BLOCK
HOOK SUPPORT BRACKET IS 032 ALUM AND BOLTS TO REAR OF ENGINE MOUNTS
3-0-4
U.S.NAVY
BLACK
WHITE
FUEL TANK
SUPER AEROTRX ESCAPEMENT
"U" BOLTS
ELMIC TIMER
HOOK RELEASE WIRE
1/16 WIRE TAIL WHEEL STRUT
ARRESTING HOOK IS 1/16 WIRE
3/4" WHEEL
RED
ALUMINUM COWL HELD ON BY 2-56 SCREWS & NUT PLATES
FUSELAGE IS LIGHT GREY
1/8 WIRE GEAR AND BALSA FAIRINGS
BALSA FAIRINGS
1/4" SHEET L G GUSSETS
LEAVE THIS AREA OPEN FOR ACCESS TO HOOK RELEASE
092U-1
VOUGHT SIKORSKY "KINGFISHER"
ALL FUSELAGE BULKHEADS AND WINGS RIBS ARE 1/8" EXCEPT AS NOTED
DESIGNED & DRAWN BY JIM MOYNIHAN
SCALE: ONE INCH EQUALS ONE FOOT
FUEL TANK
2-3/8" WHEELS
PLANK ENTIRE FUSELAGE WITH 3/32" x 1/4" PLANKING AND SILK
SIDE REEL 1/8"
ENGINE BEARER
NOTE BEND IN HOOK & SPRING
NOTE DOUBLE REEL TO ALLOW HOOK SWING
ESCAPEMENT RUBBER
1/8 DOWEL TO CONNECT THE ELEVATORS
1/8 PLY TWO & ONE BALSA
THROTTLE LINKAGE
ESCAPEMENT
1/32 CELLULOID CANOPY & WINDSHIELD FIT BY CUT & TRY

What is this? FAI gas champ, Dave Kneeland, helps Conrad display his flying technique, consisting of an upturned peaked cap and a confident smile. The two boys do a little explaining in MAN at Work.

# "CONRAD"... Our Hero

***Look, ma, I'm flying! With assist from Jetex 50, modeling's Sad Sack spreads his arms and takes off. And, by gosh, even the jets can't do better than our intrepid birdman.***

**And away we go—heh, Dave, don't point me that way! Two sizes of sheet balsa, some cement, is about all you'll need to make this scientific flying machine from the accompanying full size plans.**

**By BILL DEAN AND RAY MALMSTROM**

▸ During a discussion on cartoon art, we both voted Conrad tops in the model magazine field. To mark the occasion suitably, we decided to produce a flying version of Mr. C.—the result of which appears in the leading photo.

Dave Kneeland was so tickled with the original when he saw it at Cranfield last August, we replaced Conrad's head with a likeness of Dave and presented him with the model at the Banquet, on the occasion of his winning the '53 World Free Flight Championship. The biggest joke about this Jetex 50 powered job is that it really flies well, as you can prove for yourself after a couple of hours at the workbench.

Trace the parts onto medium weight sheet balsa, using 1/8 in. for the body and 1/16 in. for the arms, legs and feet. Make two wing panels (sorry—arms!) to the pattern shown and round off the edges of all the parts. Taper the body aft of the arm slot to 1/16 in. thickness at the extreme rear and pierce two holes for the Jetex clip mounting screws. Sand all parts quite smooth—finishing off with the back of the sandpaper—then mark on the decorations in soft pencil. Now go over the pencil lines with colored ball point pens, taking care not to smudge the ink.

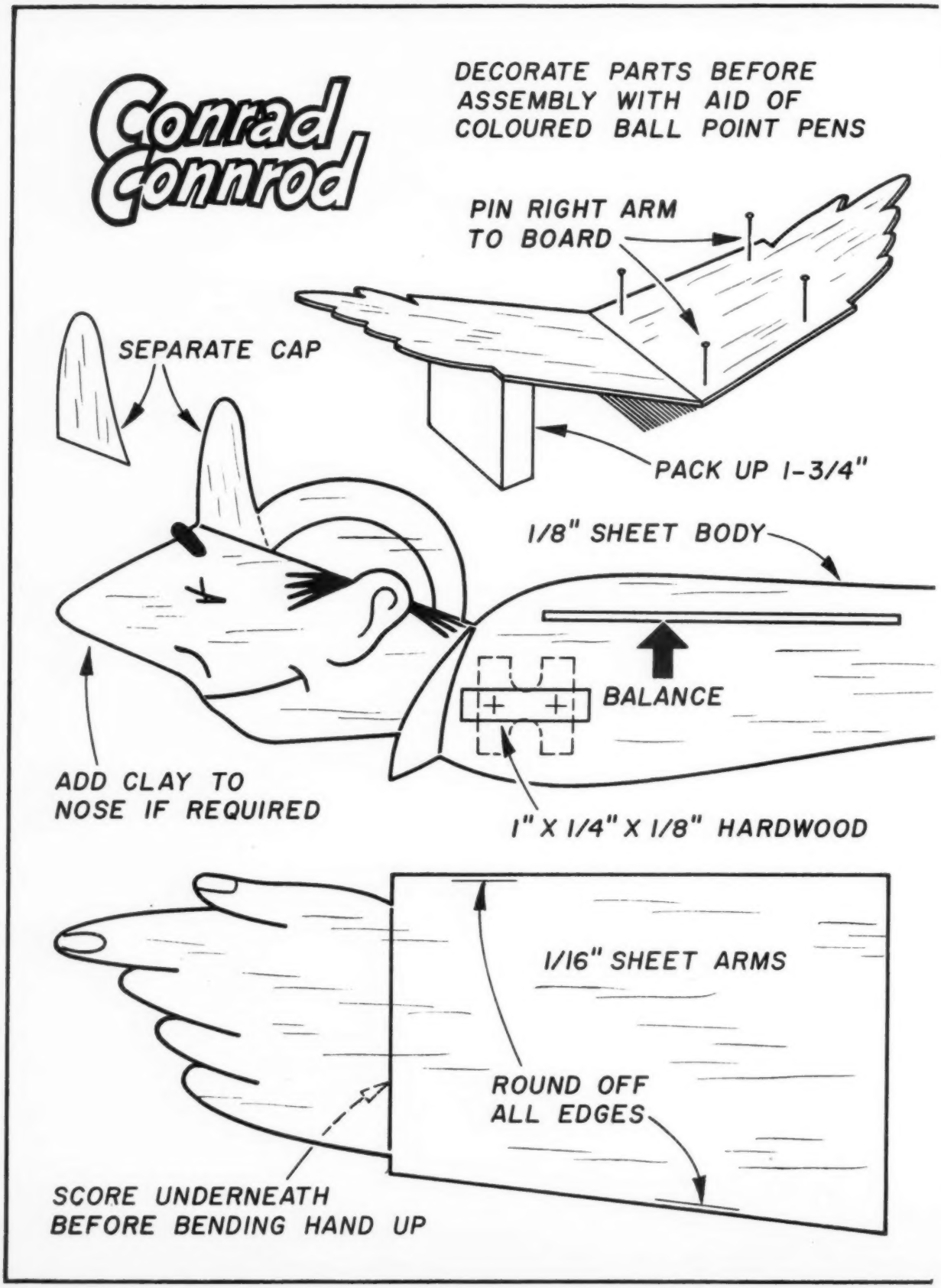
Chamfer the arms (at the arm pits?) to allow for the dihedral, then pin the right one to the building board and pack up the other 1 3/4 in. as shown. When dry, scour the wrists on the underside and bend upward, squeezing cement in the cracks (ouch!) and checking the tilt with the angle template. Cut the legs apart at the center line, then cement together, using the triangular template to check the angle.

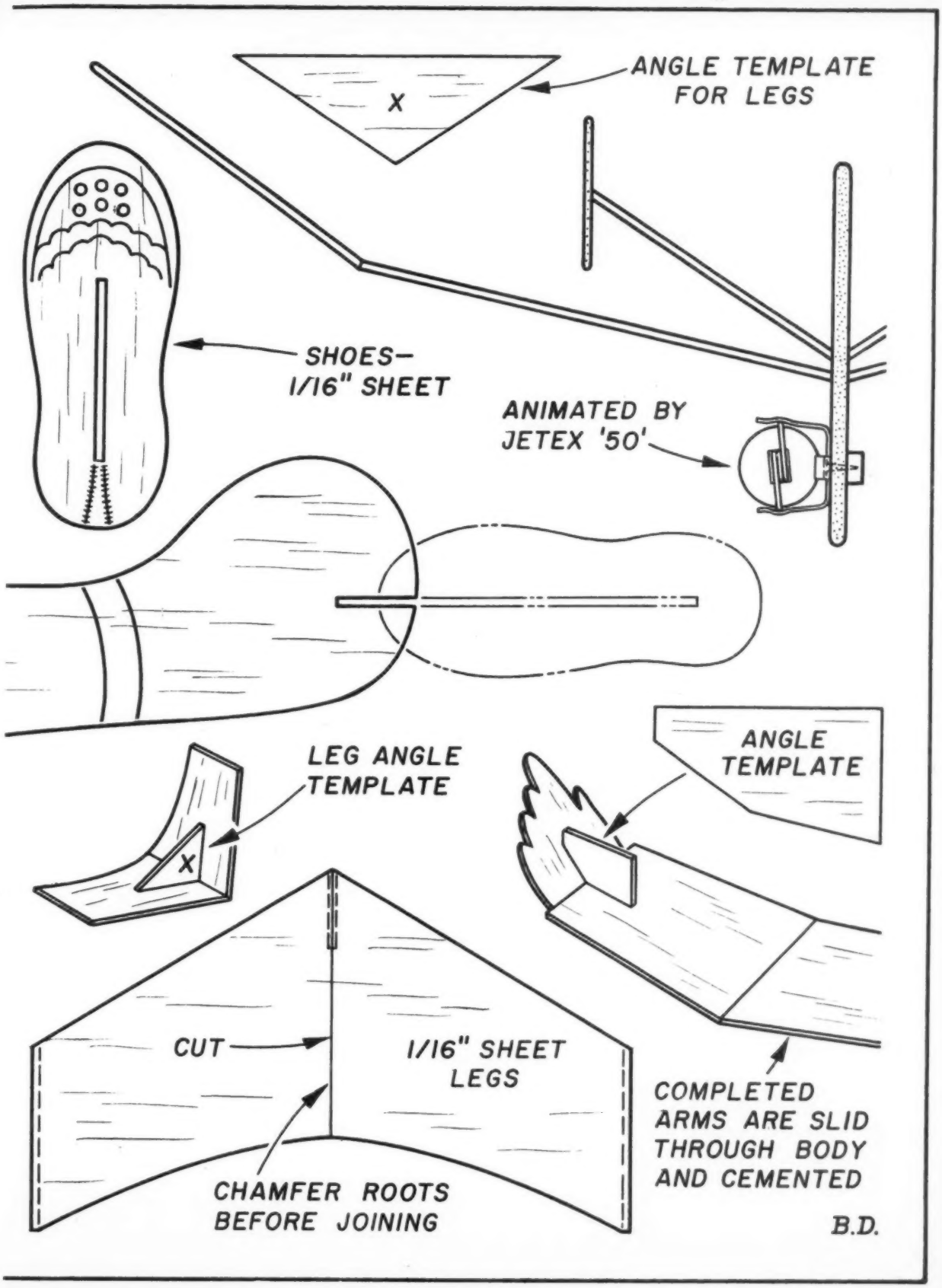
Cement the shoes to the legs, making sure that they are vertical in the front view, and put aside to dry. Now slide the completed arms through the body slot and cement well, carefully checking alinement. Complete the assembly by cementing the legs into the rear body notch.

All that now remains is to attach the Jetex clip to the right side of the fuselage. Cement a small strip of hardwood to the left side, then screw the clip in place. A 1 x 1/2 in. rectangle of asbestos paper cemented just behind the clip will prevent a fire starting in the vicinity of Conrad's hip pocket.

Test glide over long grass with the Jetex motor in position, adding clay to the nose to correct any stalling tendency. Slight trim adjustments may be made by gently warping the arms or legs. When you (*Continued on page* 51)

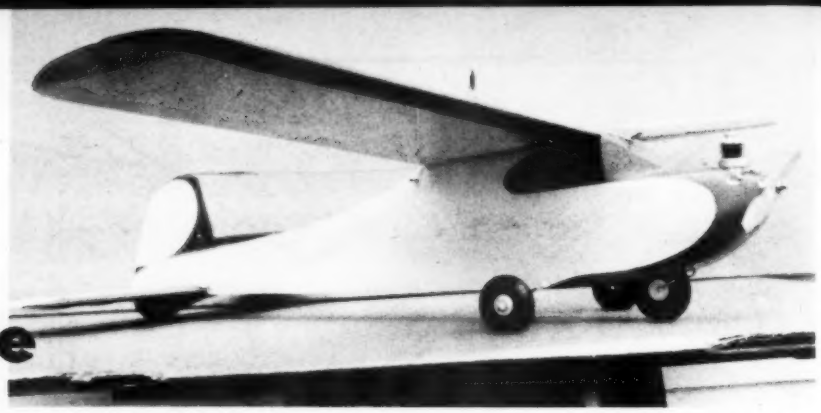
SEE PLANS ON NEXT TWO PAGES


Conrad Conrod
DECORATE PARTS BEFORE ASSEMBLY WITH AID OF COLOURED BALL POINT PENS
PIN RIGHT ARM TO BOARD
SEPARATE CAP
PACK UP 1-3/4"
1/8" SHEET BODY
BALANCE
ADD CLAY TO NOSE IF REQUIRED
1" X 1/4" X 1/8" HARDWOOD
1/16" SHEET ARMS
ROUND OFF ALL EDGES
SCORE UNDERNEATH BEFORE BENDING HAND UP

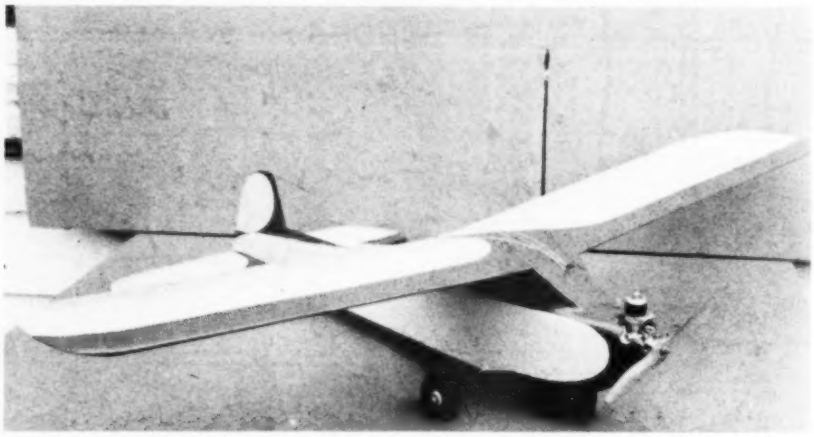

ANGLE TEMPLATE FOR LEGS
X
SHOES— 1/16" SHEET
ANIMATED BY JETEX '50'
LEG ANGLE TEMPLATE
X
ANGLE TEMPLATE
CUT
1/16" SHEET LEGS
CHAMFER ROOTS BEFORE JOINING
COMPLETED ARMS ARE SLID THROUGH BODY AND CEMENTED
B.D.

# 1/2 Wave

By HARVEY A. THOMASIAN



Shown here with an .065 engine for power, this little ship has soundly worked out features, such as short coupled tricycle gear which allows the plane to ride quickly on rear wheels for steering on take-off. Below—It is impossible to bash this nose wheel! Fuselage is of sheet balsa construction.



***This is one of the finest small RC jobs yet published. Because various experts who have seen it fly recommended that MAN print plans, you can bet your boots it is a real performer. Hot .049's to .065's.***

▶ The 1/2 Wave began as a small radio job designed to duplicate the flight characteristics of larger radio controlled ships. To this end we have built into the ship good stability, both directional and longitudinal, excellent wind penetration, and maneuverability.

The ship is of robust construction—take a glance at the plans—and will take all kinds of beating without falling apart. The construction is conventional in most respects and sufficient information is given on the plans to enable one to assemble the ship with ease. Each piece of balsa is a common size obtainable in all hobby shops.

There is sufficient room in the fuselage to accommodate any of the smaller receiver units on the market now. Our ships have been flown with the Lorenz and the North American two-tube receivers. The North American job is shown on the plans.

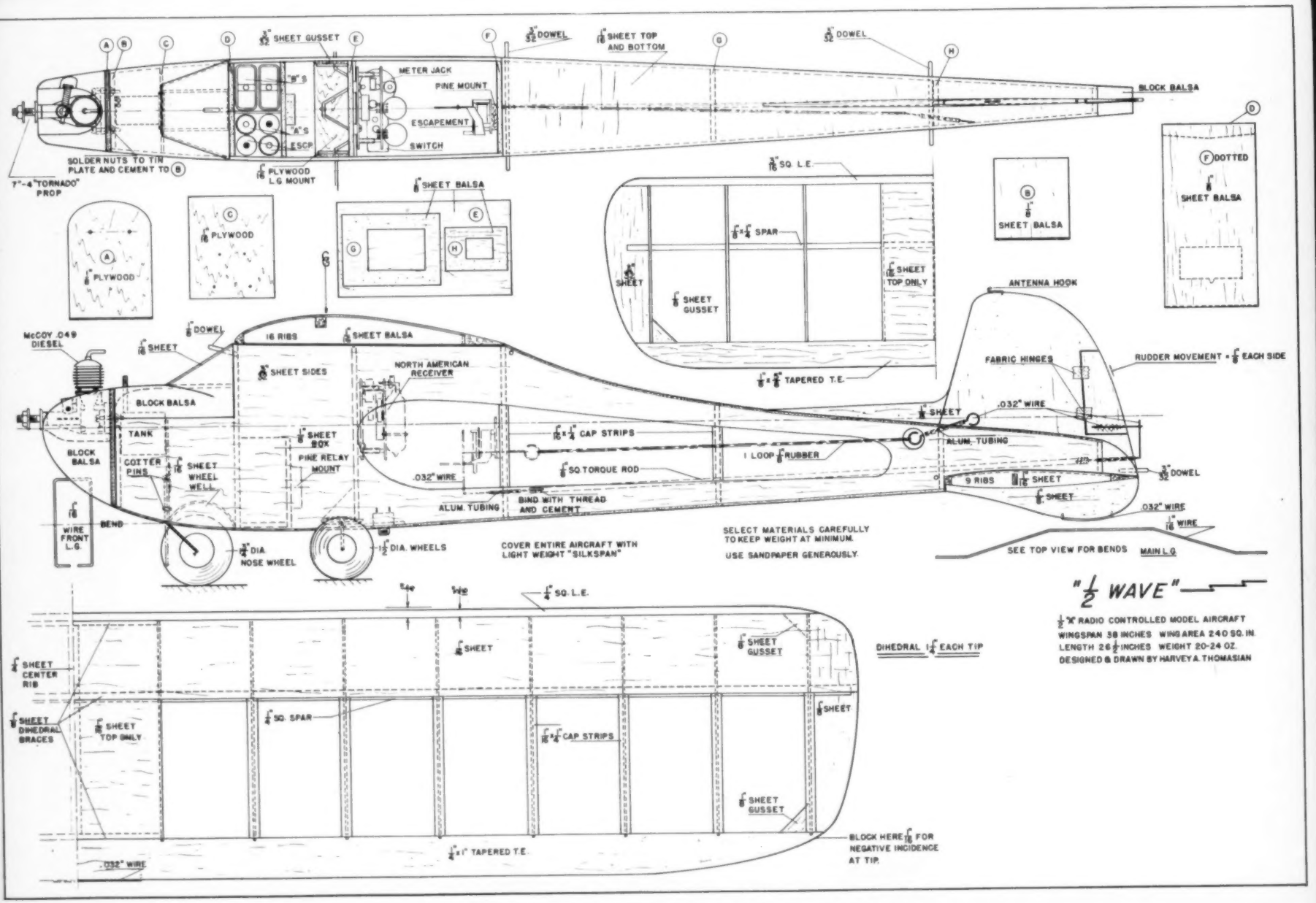
Author with a Mac Diesel-powered version, as shown on the plans. Proportions are right.

Much fooling around was done with landing gears before the one shown was chosen. Inasmuch as the nose wheel is mounted on a trailing link, there isn't much possibility of its bending back. Its semi-retracted position prevents nose-overs in deep grass common to long dangling type nose gears. The moment arm between the nose wheel and main gear is short, minimizing the effect of leverage and permitting the ship to be steered by rudder during take-off. The main gear is located under the center of gravity to lessen a nosing down tendency from thrust during take-off, and shortens the take-off run.

The radio receiver is mounted solid to the ship, and no difficulties have been experienced here, although it would be wise to check the wiring occasionally for cracks from vibration. The Sigma 4F relay is mounted solid to the ship on the pine relay block, and has worked out well in this position.

Each wing half is built complete on the plans, including leading edge sheeting and cap stripping. This eliminates the addition of parts after the section has been lifted from the plans and thereby prevents warping. Only the center sheeting, rib, and dihedral braces are added later. There is no construction on the underside of the wing as it is flat and most of its strength belongs in the upper curved surface, anyway. Do not forget the 1/16 in. negative incidence in the wing tips. It would be wise to watch this during covering and doping. The left half wing is constructed by oiling the opposite side of the plans and working from it.

Escapement installation follows conventional practice. We used the reliable torque rod method of rudder control as it is easy to adjust and maintain. The forward position of the escapement keeps the CG forward and allows easy inspection and adjustment. Incidentally, the aluminum tubing at the forward end of the torque rod is cemented into (*Continued* on page 49)




# "½ WAVE"

½"A" RADIO CONTROLLED MODEL AIRCRAFT
WINGSPAN 38 INCHES WING AREA 240 SQ. IN.
LENGTH 26½ INCHES WEIGHT 20-24 OZ.
DESIGNED & DRAWN BY HARVEY A. THOMASIAN

FULL SIZE PLANS AVAILABLE. SEE PAGE 49.

Delta free flights are turning up more and more at English contests. T. J. Warren, holding John Smith's 36 in. job, Amco .87 power. Strip ribs over spars.

Crescent wing planform, a la new Handley Page jet bomber, by Mike Shepherd, England. The span 36 in., length 42 in., 16 oz.

# AIR ★ WAYS ★

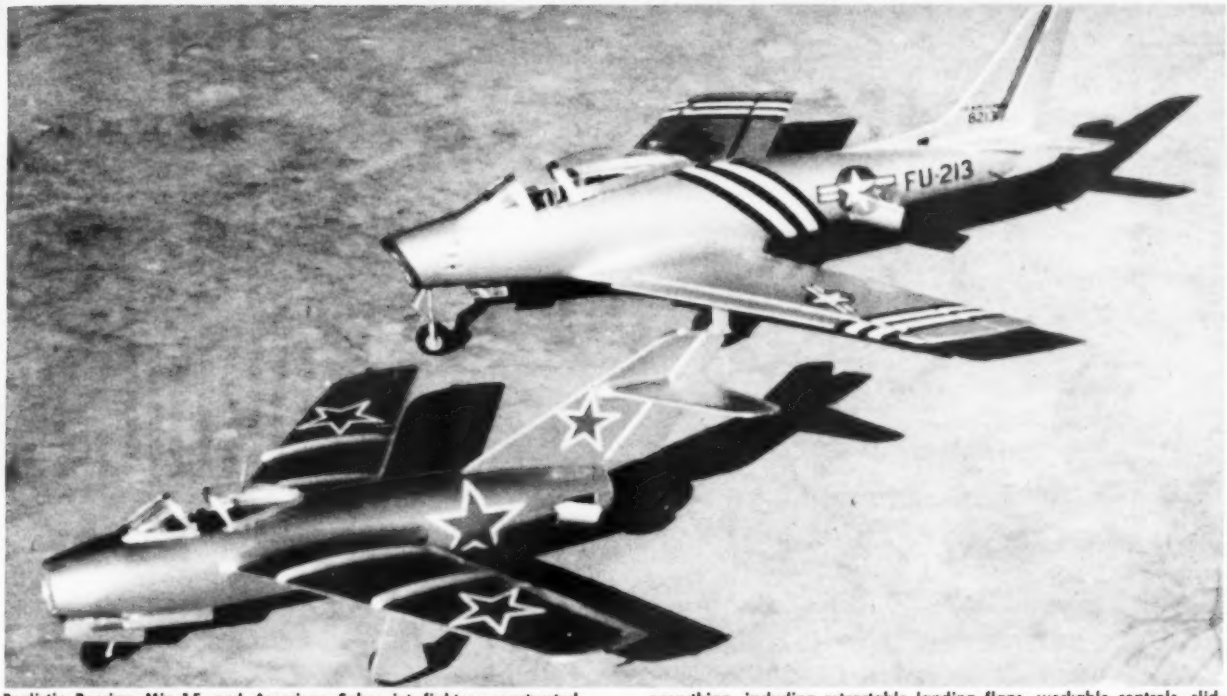
***Fasten those seat belts! Here we go again with another super collection of reader models.***

Vought Cutlass, a 3/16 in. scale solid with 7-1/4 in. span, handiwork of Lt. Timothy M. Brown, Keesler Field, Biloxi, Miss. Pic, Lt. V. Moldaver.

Von, canine "plane finder," poses with his master, G. W. Moore, Corona Del Mar, Calif. Moore goes in for free flight scale that really fly.

Below—When local paper offered Torp .049 for selling two subscriptions, John Fer, San Pedro, Calif., got engine for ducted fan Sabre from MAN.

Below—Start 'em young, says Maury Fein, Inglewood, Calif., whose three year old son, Lenard, holds papa's Atwood .049 red-hot Zeek free flight.




Realistic Russian Mig-15 and American Sabre jet fighters constructed from Testor kits by Edward Chavez, San Antonio, Texas. These jobs have everything, including retractable landing flaps, workable controls, sliding cockpit canopies. Note nosewheels appear slightly turned. Neat, eh?

Here's something different, a Saunders Roe Princess, monster English flying boat, modeled by Flying Officer A. C. Smeed, Claresholm, Alta., Can.

Lt. Dwight Brooks, Komaki AFB, Nagoya, Japan, swears by Sterling scale jobs, and sends this Monocoupe picture to illustrate. Ten coats of dope.

Below—Scale fans Ed Luca, left, Mike Lutz, with two flying Pipers at a Screamin' Demon contest on Long Island. The East favors flying ability.

Below—Exceptionally nice job for Half-A team racer, by Bob Barton, Atlanta, Ga. Called Pogo, it has done about 70 mph with Thermal Hopper.

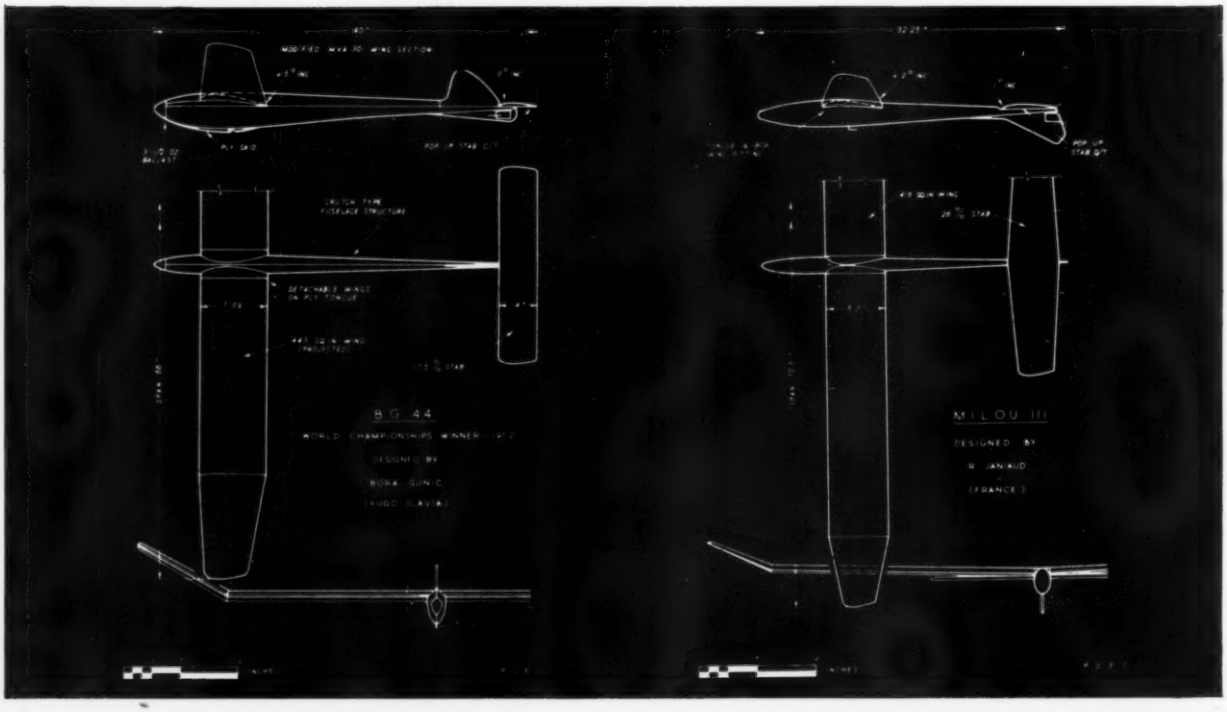
Many kits for A-2, or Nordic class, gliders are available in Europe. This is the Marauder, by Mercury Models, London. Cost, lack of materials and of engines, all contribute to popularity of gliding.

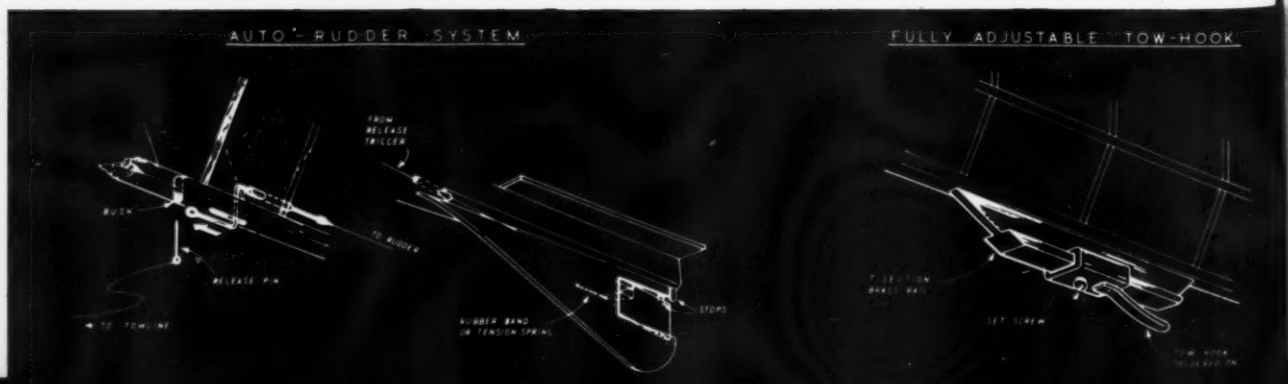
# ? HEP ON NORDIC ?

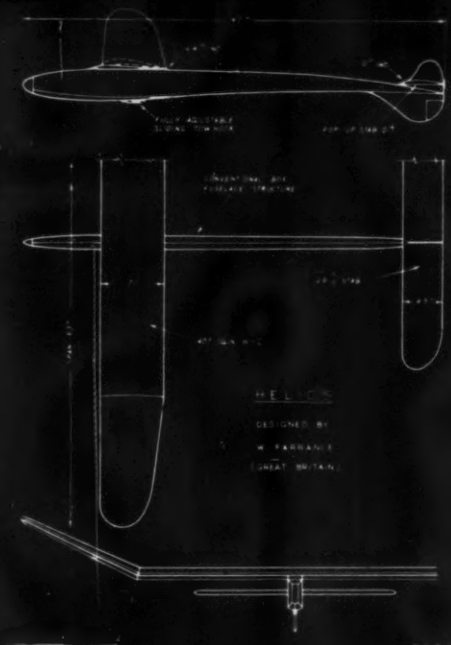
## Part Two

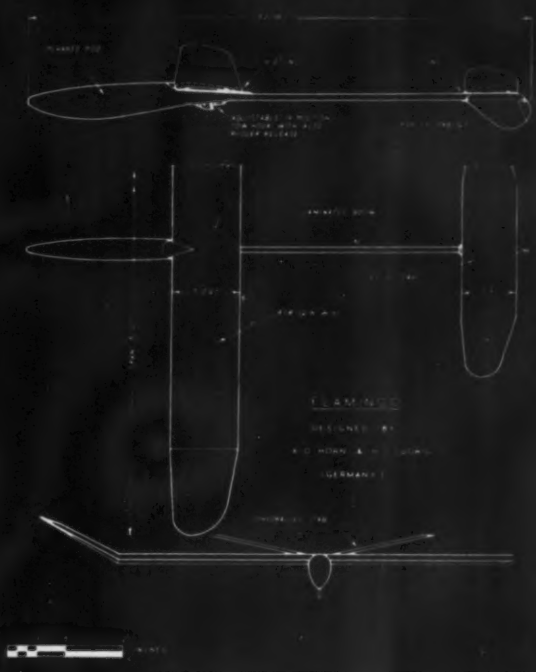
***Completing an authoritative round-up of info, this discussion will help American modelers to make up lost time in glider competition.***

**By P. G. F. CHINN**







▸ As we stated in our concluding paragraph of last month's article, Nordic A-2 design layouts are still quite fluid. Just how wide is the variation in moment-arm lengths, stabilizer areas and the like is indicated by the data table accompanying this article which details 10 A-2 gliders from seven different countries.

These 10 towliners include both the 1951 and 1952 World Championship winners (Austrian and Yugoslav respectively), the 1952 (German) second place winner, the 1953 British eliminations winner and a pioneer American A-2 design, Dick Everett's El Nordo.

Generally speaking, the type of layout favored depends on the country of origin and the type of flying conditions normally prevailing. Thus, some Continental designs tend toward ultra long fuselages with very small stabilizers, permitting the biggest possible wing area, and thus lowest wing-loading, for maximum performance under smooth conditions. The typical British A-2, on the other hand, will have a shorter moment-arm and bigger tail area to promote rapid recovery in the more turbulent conditions usually experienced in the British Isles.

If one is building A-2's primarily for a crack at the World Championship Swedish Cup contest, then it is obviously necessary to try to produce a model suited to the sort of conditions likely to be encountered in the country in which the contest is going to be held in that particular year. Oskar Czepa's win in 1951 can be largely attributed to the fact that he had a model well suited to the weather conditions at Lesce Bled, Yugoslavia, where the contest was held that year. His model had the largest wing area and longest fuselage yet seen and, under still air conditions, this model probably had as low a sinking speed as has yet been achieved with an A-2 class glider.

A model of this type, however, would not necessarily do well in the usual conditions experienced in, for example, part of the eastern United States. Some British builders tried Czepa type designs after the 1951 contest but, for the most part, these have not shown up well against more orthodox layouts in the usual British weather.

On the other hand, a "compromise" layout in which a tail area of 21-24 per cent is used in conjunction with a slim, well proportioned fuselage of medium length, has shown the ability to perform well under all conditions. We feel that it is on this type that most modelers would be well advised to concentrate.

Under virtually still air conditions, such as were experienced in Austria for the 1952 World Championship contest, it is possible, of course, to take advantage of a large wing area/total area percentage. If the contest location suggests the possibility of such weather, then it may be worth while to build a reserve model expressly for these conditions, but unless identically perfect conditions are certain for the national qualifying trials (and this can hardly be guaranteed regardless of location), a model more suited to rough weather is obviously one's first requirement.

Actually, although we think of tail moment arm lengths and stabilizer areas as being directly inter-related (a small stabilizer area requiring a long moment-arm, and vice versa), the specifications of various leading A-2's indicate that there can be quite an appreciable variation in the combined moment-arm and stab. area value. For example, Ossi Czepa's 1951 winner had less than 15 per cent stab. area and to compensate, he used a moment-arm (measured from the center of gravity to 50 per cent chord point) of some 50 in. Gunic, 1952 winner, used a little more area, 17.5 per cent (or about half of what we used to consider necessary in the interests of stability), yet his tail moment was only 30 in. The over-all length of Gunic's design, in fact, is little more than half that of Czepa's. (*For a three-view drawing of Czepa's Toothpick, see MAN, Feb. '53.*)

To a lesser extent, of course moment-arm lengths depend not only on the area of the stabilizer, but also on the aspect ratio of the wing and on the type of wing section employed. A decrease in wing aspect ratio: i.e., an increase in the mean chord, demands an increase in tail moment. Nevertheless, it is obvious, when one compares data for a number of leading models, that there is still considerable divergence of opinion on the total stability factor required.

This is shown by our graph. Czepa's Toothpick is still in the realm of the unorthodox and (*Continued on page* 46)

Contestant winds up the lines on his U-Reely after a heat flown with the popular Key. Team racing, like stunt and speed, needs specialized engine.

# TUNING

## Team Racing Engines

**By E. C. MARTIN**

***The advanced flier can improve his engine for ideal results in this highly demanding category.***

▸ The qualities particularly desirable in a special team racing engine may be summed up as follows:

1. High bhp output at moderate rpm and high torque throughout the speed range, in order to obtain high flying speeds; brisk take-off acceleration; and swing coarse pitch props to produce high airspeed at the lowest compatible rpm.

2. Instant starting, both hot and cold, without needle valve alteration from the optimum performance setting, when mounted inverted.

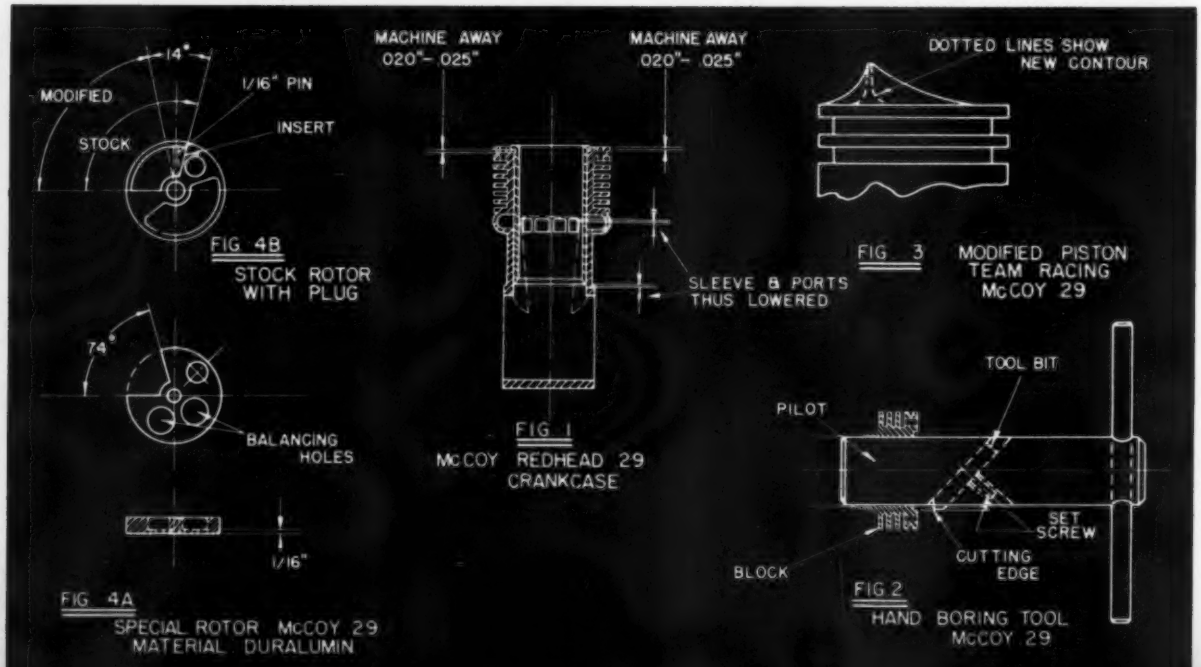
3. Exceptional fuel economy.

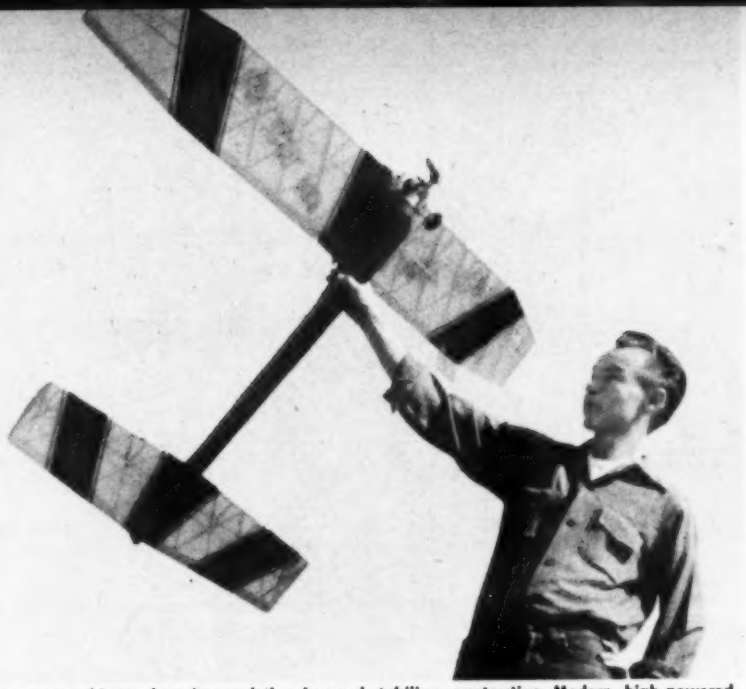
4. Low rate of wear, and ability to withstand severe abuse.

5. Ducted exhaust system for cowling convenience, and general configuration and mounting method suited to team racing application.

6. Air intake easily accessible for choking, and clear of hot cylinder and exhaust, and located to promote efficient fuel feed from a conveniently placed fuel tank.

While various .29 engines can be used in team racing, the McCoy Redhead .29 most closely fulfils these requirements. To satisfy Point 1, a little modification is necessary. Point 2 is met satisfactorily. Point 3 requires modification. Points 4, 5 and 6 are "naturals," and the Mac (*Continued on page* 50)



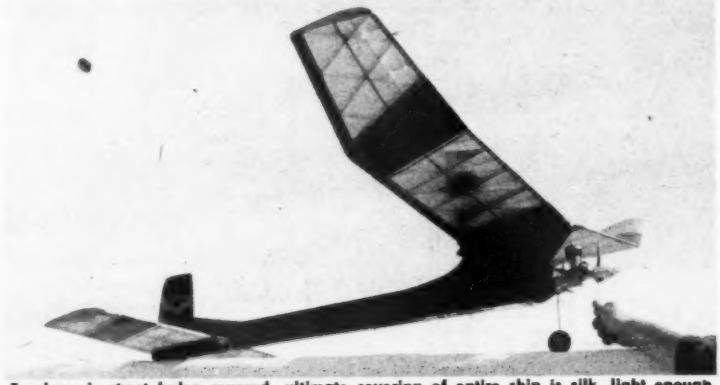


The author poses ship to show its geodetic wing and stabilizer construction. Modern, high powered, fast free flights are highly vulnerable to warps, a failing minimized with this construction.

# Ah-Trax-Ya...

By DICK WERNER

***For the contest fan, lively performance with excellent glide. For .29-.32's, can fly on .19's.***



Fuselage is sheet balsa covered—ultimate covering of entire ship is silk, light enough in this size machine, vastly stronger than any paper. Stab is fixed; chute dethermalizer. Hinged trim tab, left wing, varies position and effect with speed; weight added to it, increases effect. Resembling the Hogan, Ah-Trax-Ya actually fully independent design.

▶ This ship was designed with the idea of having a job large enough for an excellent glide yet light and streamlined enough to outclimb most competitors. With a hot Torp .29 or .32, it will do just that. It can also be flown with a Torp .19, if you want a slower climbing model.

Build fuselage backbone and pylon outline. Build crutch and put in all formers. Set backbone in place on former notches, add side pieces, pylon leading edge, pylon ribs, and square uprights in rear of fuselage. Remove from plans and install firewall. If you choose to use a round nose as I did you should fill the nose in with scrap blocks so that you will be able to taper and round nose as desired without losing strength. Add gas tank at this point if not using timer-tank.

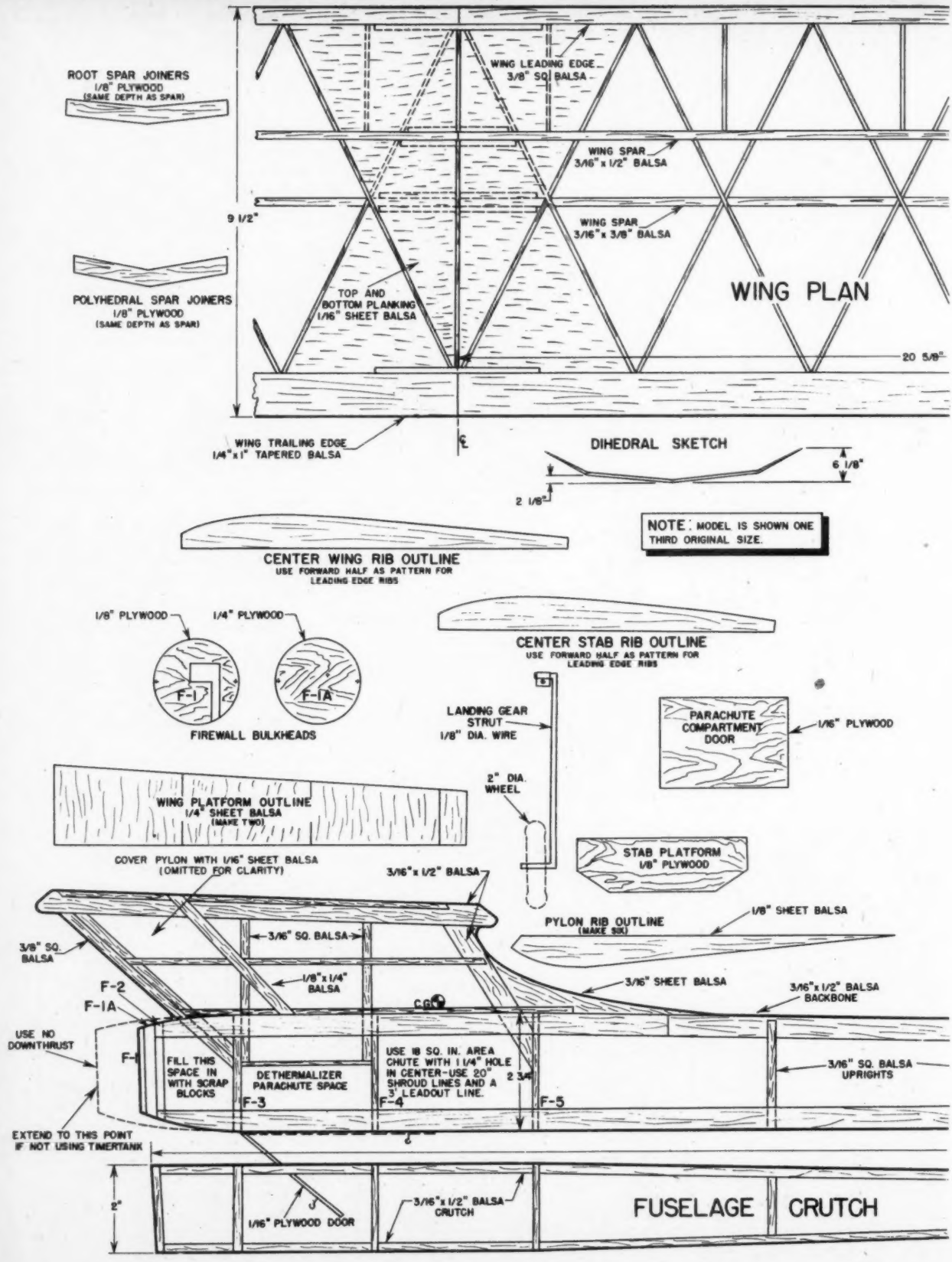
Plank fuselage sides, bottom, and pylon with 1/16 in. balsa. Add wing platform, stab platform, tail; sand, add gauge around the nose, and fillet where desired.

Lay down leading and trailing edges. Set ribs in place and notch for spars (being sure to bevel properly). Notch the ribs where they cross each other, (the bottom rib should be notched from the top, half way down and the top rib should be notched from the bottom, half way up). Remove ribs and lay down bottom spar. Install ribs, add top spar, sub ribs, and wing tips. When dry, put in dihedral and polyhedral, being sure to put in plywood gussets and cementing well. Plank center section and sand smooth.

If at all possible, cover the entire ship with silk. Silk is easy to work with and adds much strength to your ship. After the ship is covered, use a good filler on the fuselage to fill the pores of the silk. I have had good results with Aero Gloss Balsa Fillercoat. Trim ship with desired colors and fuelproof.

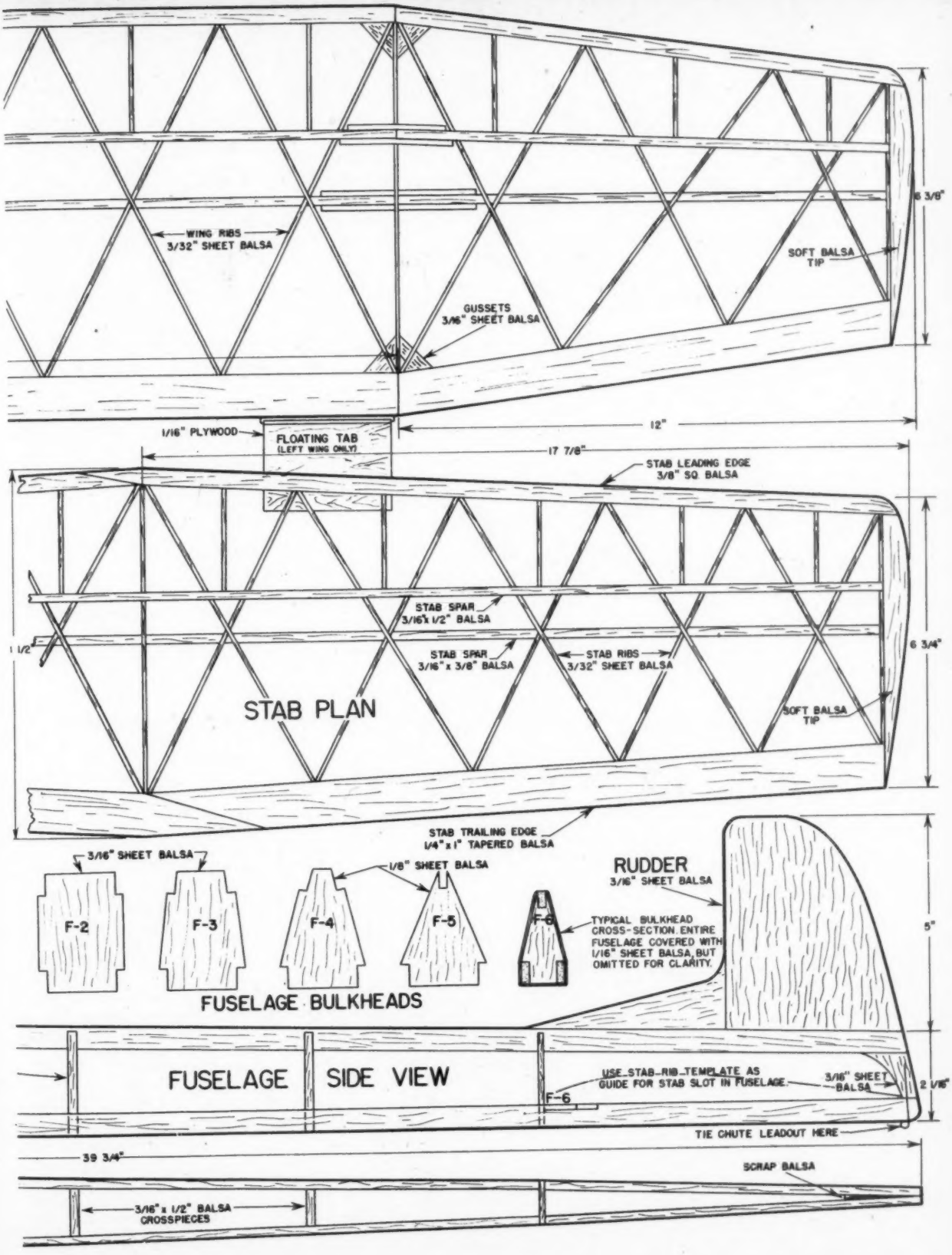
Check for warps and key surfaces. Check the glide by hand launching. It should be fairly fast and slightly to the left. Stick a plug in the engine intake for the first few power hops so that you can have engine running as slowly as possible. The ship should climb to the left, making about 1 1/2 turns in 20 seconds. Make all thrust adjustments with 1/32 in. washers between engine and firewall. If the ship has a slight stall, add clay to the floating tab until this is corrected. As for props, I used 9-4 or 10-4 Tornadoes.

SEE PLANS ON NEXT TWO PAGES





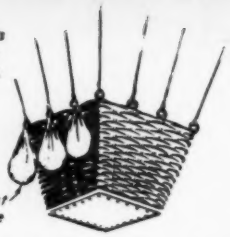

**FOR MANY, THE BIG THRILL IS THE HIGH CLIMB AND LONG GLIDE OF A GOOD FREE**




**FLIGHT MODEL. THESE ONE-THIRD SCALE PLANS MAKE UP JUST SUCH AN AIRPLANE.**

More of old-timer Christy Magrath's hints on scale modeling. This time he also covers lighter-than-aircraft.

**12**

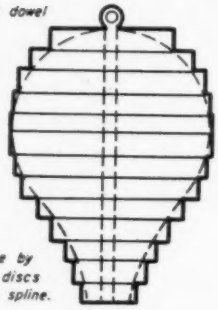


Bags of ballast cut from pine

Balloon basket can be woven of soft wire. Most baskets were square.

**13**

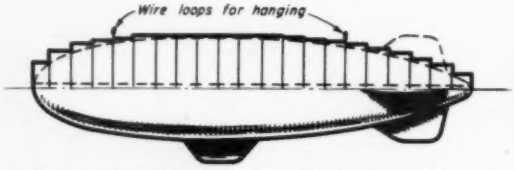
Large wood dowel



Use casein or "Weldwood" glue.

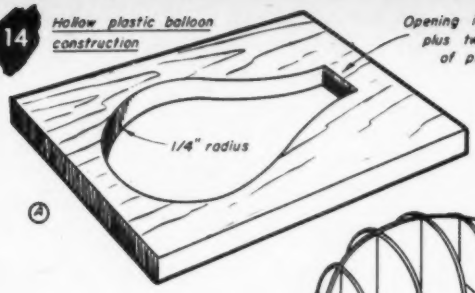
Shape with a rasp and sandpaper.

Balloon can be made by laminating hardwood discs together on a dowel spline.

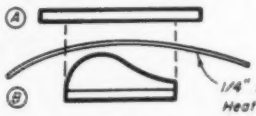



Same method for blimp making. Above, lower half is shown as it would appear after sanding.

**14** Hollow plastic balloon construction



B Plywood form filled with plaster

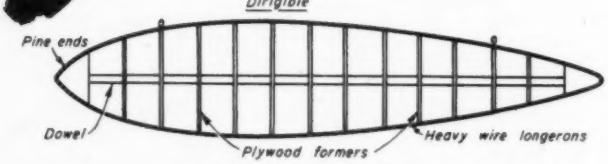



1/4" sheet plastic. Heat at 300° for 5 minutes.

Press A over plastic on B. Clamp till cool and cut along trim line.

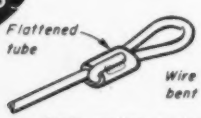
Make two halves. Cement together with ethelene dichloride or prepared plastic cement.

**15** Dirigible




Cover with muslin (Flightex wing fabric is best), and dope thoroughly.

**16**

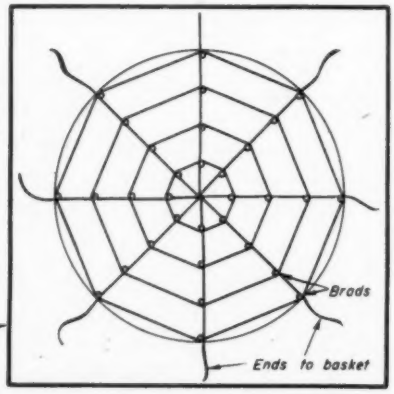



Wire passed thru tube, bent back and soldered.

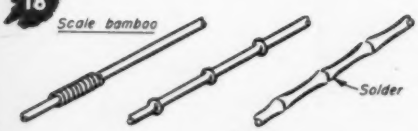
Early method of locking wire

**17** Simplified layout of spherical balloon net.

Draw a circle 3 diameters larger than balloon. Lay out 36 radii, 10° apart. Cover with waxed paper and drive in small brads to make a jig. String crochet around form, cementing each crossover. When dry, remove net from form and tie ends to basket edge.

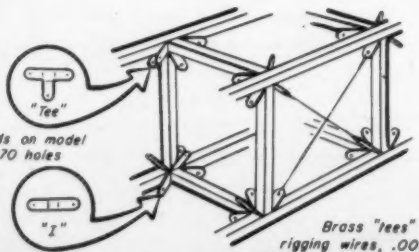



**18** Scale bamboo




Wrap polished copper wire around steel rod in spring-like form. Cut off rings thus formed and solder in place. On full size bamboo, nodes are 12" to 15" apart.

**19**




Size depends on model
Drill #70 holes

Brass "tees" for rigging wires, .005" to .006" sheet stock.

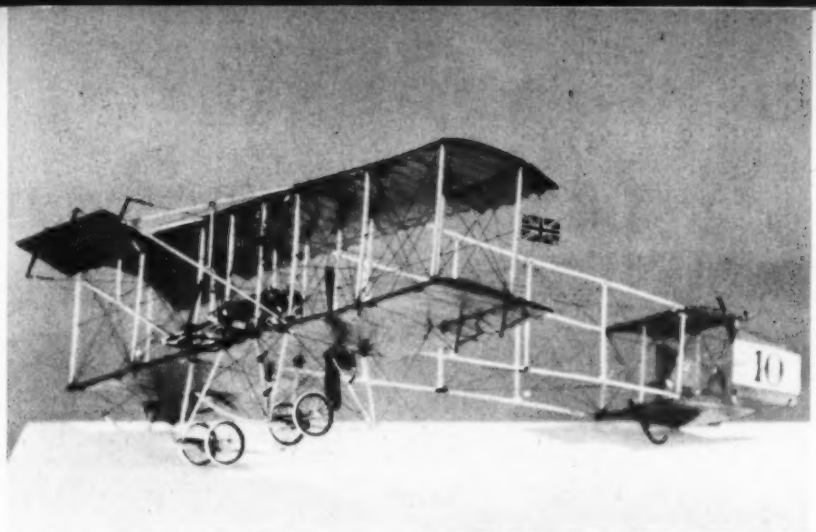
**20**

For windblown hair, use steel wool.

(1) Make a "skeleton" of 1/16" brass wire.

(2) Cover skeleton with "Marblex". This is a clay that hardens without firing.

(3) Carve fine details, paint the figure. Bend the copper fingers around the controls.



Countless hours went into this French Farman—scale turnbuckles throughout, and wire-spoke wheels.

# 36 YEARS OF SCALE MODELING

By CHRISTY MAGRATH

•

PART II

***Tips from a master craftsman, recollections of by-gone planes, make absorbing reading, offer a priceless glimpse of a vanishing art.***

▸ Using the jeweler's saw you can easily cut very thin metal by spot cementing it to thin scrap plywood. In this way sharply curved layouts can be cut more easily than by using aircraft "Dutchmen" shears or small duck-bill shears. An assortment of various types of metal shears is handy, but you can do very well with about four or five pairs ranging from right and left hand "Dutchmen" to regular tinner's type.

In making a fuselage from square or round wire, the procedure is basically the same as for a balsa framework job. You may either lay out a fuselage for, say, the Nieuport 17, or get a photostat made to the required size. Project a top view of the fuselage directly above the side view, and draw in the exact size of the wire you use. For example, if the wire is 1/16 in. square, your lines are 1/16 in. apart for each piece of the structure. With rubber cement, fasten the drawing to medium heavy cardboard and in turn fasten this to flat masonite or plywood. Cover with three coats of clear lacquer after first checking to make sure that all details are drawn in. If a chisel edged 3H pencil is used, solid thin black lines will result that are as good as ink lines.

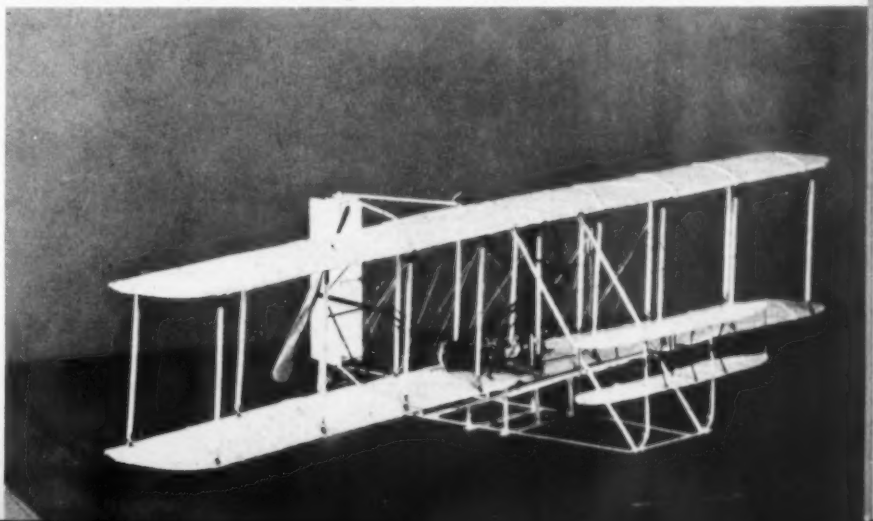
Now, fasten a sheet of cellophane tightly over this by stretching and using masking tape on the four edges. Make the side view first. Check your top view to find the true length of the top longeron and lengthen the projected side view accordingly. Remember that the hypotenuse of a right triangle is greater than its base. Cut all metal uprights, longerons and cross pieces to exact length with your jeweler's saw, and make the sides first. To make sure both sides are exact, check one side and if it is okay, lay a sheet of cellophane on top of the first side and make your second one directly on top. Wipe all solder joints with a rag dipped in wood alcohol.

Now solder the cross pieces in the following manner: in the top view, solder in at the correct angle (usually 90°) the forward cross piece and one at the point where the fuselage angles off to the rudder post. Solder in the lower cross pieces directly below. If need be, carefully curve the sides to meet the curve in the top view and solder the ends after beveling to the correct angle. Turn the fuselage upside down on the top view and squaring it up, solder in the rest of the top cross pieces on the bottom of the fuselage. After all internal details have been added, the cross bracing wires come last.

Most hobby shops carry a thin comb saw for metal and wood that comes in handy for the next operation. With this saw, make shallow diagonal cuts across the framework and solder into these cuts fine steel or stainless steel wire for cross bracing. Or if you have time and enough patience, make actual brass strip members as shown and rig your wiring in these. Actually, cross wires are only required if the doped fuselage covering shows the outline of the wires, or if you can see them when you look into the cockpit.

Dummy or actual miniature turnbuckles can be made with watchmaker's tools for a really perfect model. Using a jeweler's screw plate, you can make your own taps for brass from fine jeweler's broaches in this manner: carefully heat the end of the proper size broach for the desired tap in the flame of a small alcohol torch and let cool. Now, simply thread the annealed broach with the screw plate, reheat the broach and dip it in oil immediately. No. 20 or 30 SAE oil is fine. Handle these tiny taps carefully and they will last a long time. Jeweler's (*Continued on page 33*)

To make authentic models like 1903 Wright Flier, the builder, of necessity, becomes a historian.



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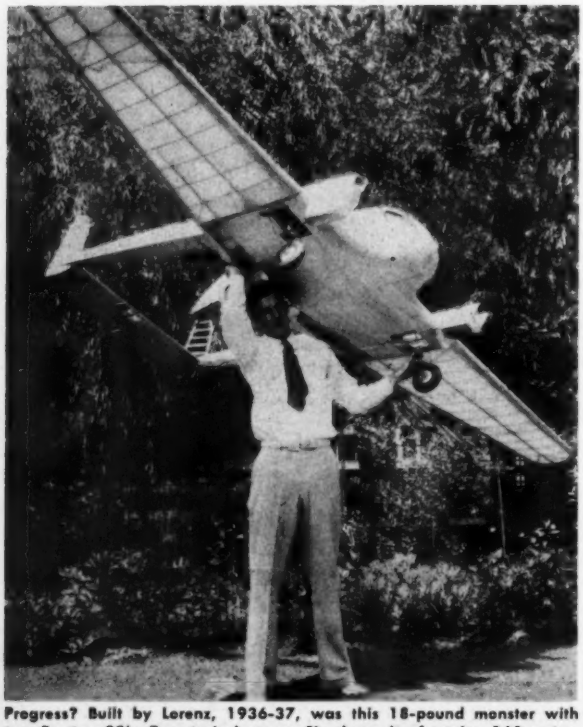
# Radio Control News

Old man's event! Don Johnson's 7-foot Cub, Vivell .35, makes 'em scatter. Flying session, Easy Bay Radio Controllers Club. Pic, Buck Joseph.

By E. J. LORENZ

***The military do things with radio controlled drones that put us in the baby ROG class. So, in addition to usual report of developments, the author begins coverage of drones and their radio.***



Progress? Built by Lorenz, 1936-37, was this 18-pound monster with two Forster .99's. Twenty-inch props. Six channels of carrier, 160 meter, motor driven servos, chord 28 in. Wing would support a 200-lb. load.

▶ We are presenting this month, and next, what we believe to be the only information of its kind ever published in any magazine: technical data, drawings, and schematics on the famous WW II OQ-2A target drone. All information has been cleared by Wright Field and although this model is obsolete, we believe there will be much of interest in this series that can be applied to model radio control planes and boats. These are not construction articles, but rather an introduction to unusual equipment. We hope the RC builder can gain information from them and come up with new and better model equipment.

The receiver, the schematic of which is shown in Fig. 1, and the servo unit, have the following specifications:

The five-channel super-regenerative receiver, known as the RC-57-A, weighed 4 1/2 lb. used nine miniature tubes and was housed in an aluminum case which measured 5 1/2 x 7 1/4 x 8 1/2 in. This equipment was designed to operate over a temperature of $-13^{\circ}$ F. to $+158^{\circ}$ F. and in relative humidity up to 95 per cent, which is mighty damp weather! Battery life for reliable operation was limited

RC boat contests held regularly at Riverside, Calif., according to E. L. Brown, lower right, holding scale Navy Shore boat for future MAN issue. "Flight pattern" is illustrated at extreme right, opposite page.

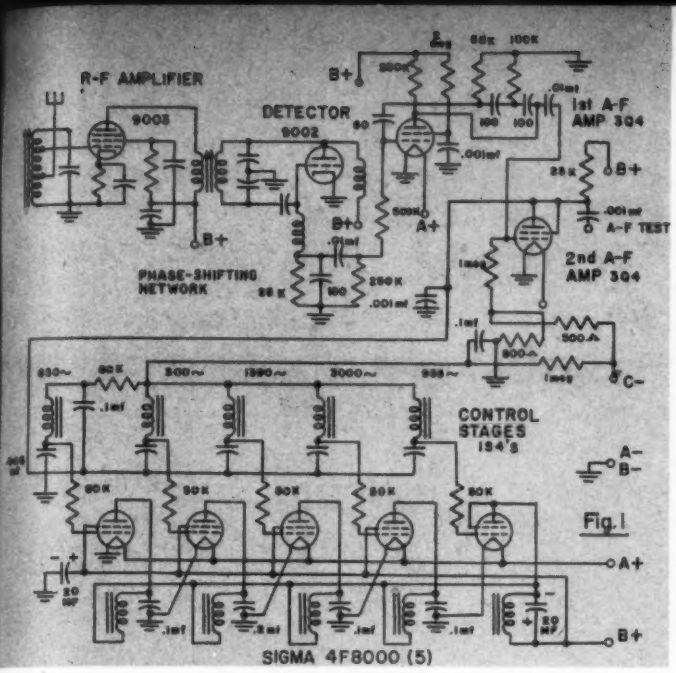
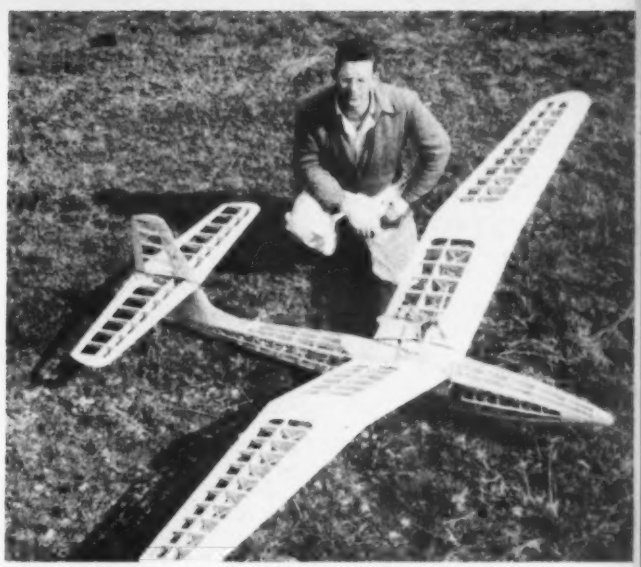



Fig. 1



Some still like them big. Ten ft., 8 in., Spitfire .65 job, counter props—rear one on gears. Single channel selector system for six circuits of control. Design by C. Carr; built by Joe Paul, Olympia.

to 2 1/2 hours of continuous duty and 3 hours of intermittent duty.

The super-regenerative detector was preceded by an RF amplifier and followed by two stages of audio amplification, which in turn fed the five series-resonant LC circuits used to separate the audio tones. The RF signal was picked up by a 12 in. antenna. The standard Sigma 4F relay was used in the plate circuit of the five output stages. The radio frequency could be changed by plugging in one of four different fixed tuned units from 68 to 73 mc. Here's how the five audio channels were assigned: 300 cycles per second, right rudder; 650 cps, left rudder; 955 cps, parachute; 1390 cps, up elevator; 3000 cps, down elevator. Modulation of the transmitter at 60 per cent plus or minus 3 per cent was sufficient to operate the relays.

You will note on the schematic a point marked *A-F TEST* at the plate of the second audio stage. This point terminated in a jack connection and was used for plugging in earphones to test the super-regenerative action of the detector, in addition to the A-F signal being fed to the output tubes.

The power supply consisted of standard batteries used in model RC work. A six volt battery supplied the filaments of the RF section, and a 1 1/2 volt battery fed the filaments of the audio and output tubes. Two 67 1/2 volt batteries in series supplied B voltage and a single 67 1/2 volt battery supplied C bias. Battery weight was approximately 6 lb.

For those desiring to do experimental work along the design of this equipment, perhaps the most needed information concerns the design of the filters. The following chart gives the Inductance and Capacitance Values for the various tones:

| | L | C |
|---|---|---|
| 300 CPS | 28.2 hy | .01 mfd + or — 5 per cent |
| 650 CPS | 12 hy | .005 mfd + or — 5 per cent |
| 955 CPS | 9.4 hy | .003 mfd + or — 5 per cent |
| 1390 CPS | 6.55 hy | .002 mfd + or — 5 per cent |
| 3000 CPS | 2.82 hy | .001 mfd + or — 5 per cent |

The Sigma 4F 8,000 ohm relays were bypassed by a .1 mfd capacitor.

One of the most important items that cannot be overlooked in the design of this (*Continued on page* 52)

Windy Joe, longer span on Cub .14, for operation at 6,800 altitude, Williams, Arizona, by Scott Hayden (pic, Jewell Hayden). That impressive transmitter rig is reassuring in the lonesome forest region there.

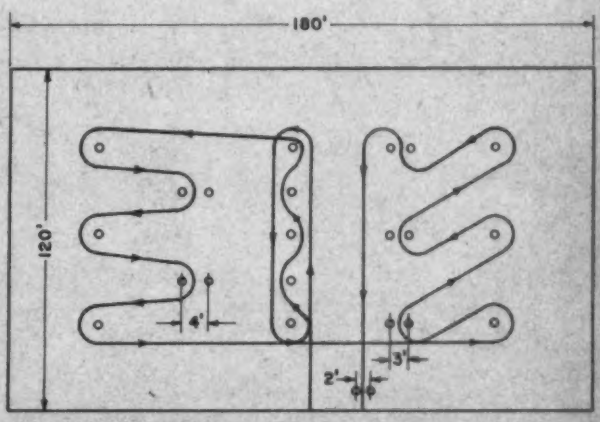
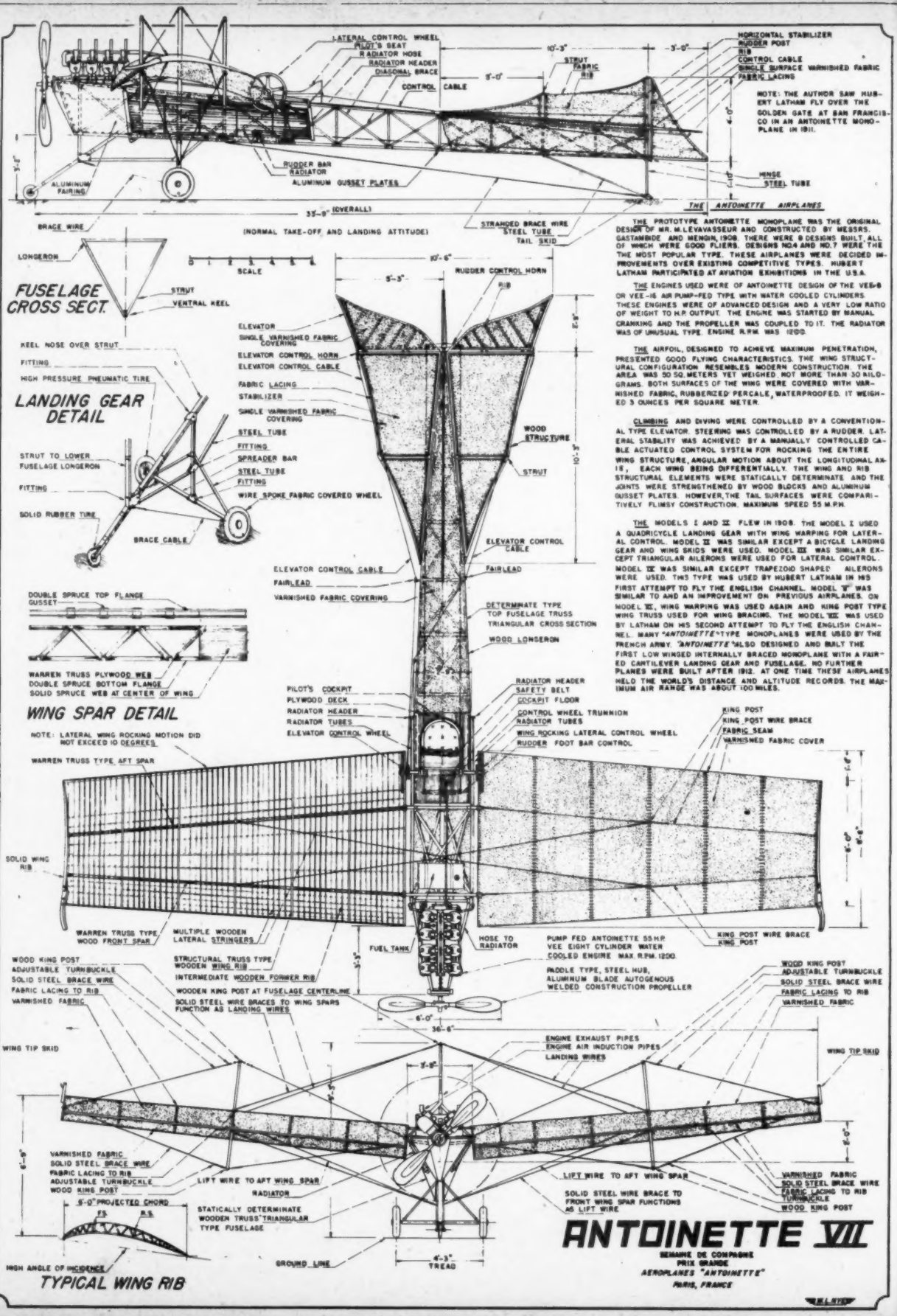



Fig. 2




NOTE: THE AUTHOR SAW HUBERT LATHAM FLY OVER THE GOLDEN GATE AT SAN FRANCISCO IN AN ANTOINETTE MONOPLANE IN 1911.

## THE ANTOINETTE AIRPLANES

THE PROTOTYPE ANTOINETTE MONOPLANE WAS THE ORIGINAL DESIGN OF MR. M. LEVAVASSEUR AND CONSTRUCTED BY MESSRS. GASTAMBIDE AND MENGIN, 1908. THERE WERE 8 DESIGNS BUILT, ALL OF WHICH WERE GOOD FLIERS. DESIGNS NO.4 AND NO.7 WERE THE THE MOST POPULAR TYPE. THESE AIRPLANES WERE DECIDED IMPROVEMENTS OVER EXISTING COMPETITIVE TYPES. HUBERT LATHAM PARTICIPATED AT AVIATION EXHIBITIONS IN THE U.S.A.

THE ENGINES USED WERE OF ANTOINETTE DESIGN OF THE V.E.8 OR VEE-IS AIR PUMP-FED TYPE WITH WATER COOLED CYLINDERS. THESE ENGINES WERE OF ADVANCED DESIGN AND A VERY LOW RATIO OF WEIGHT TO H.P. OUTPUT. THE ENGINE WAS STARTED BY MANUAL CRANKING AND THE PROPELLER WAS COUPLED TO IT. THE RADIATOR WAS OF UNUSUAL TYPE. ENGINE R.P.M. WAS 1200.

THE AIRFOIL, DESIGNED TO ACHIEVE MAXIMUM PENETRATION, PRESENTED GOOD FLYING CHARACTERISTICS. THE WING STRUCTURAL CONFIGURATION RESEMBLES MODERN CONSTRUCTION. THE AREA WAS 50 SQ. METERS YET WEIGHED NOT MORE THAN 30 KILOGRAMS. BOTH SURFACES OF THE WING WERE COVERED WITH VARNISHED FABRIC, RUBBERIZED PERCALE, WATERPROOFED. IT WEIGHED 3 OUNCES PER SQUARE METER.

CLIMBING AND DIVING WERE CONTROLLED BY A CONVENTIONAL TYPE ELEVATOR. STEERING WAS CONTROLLED BY A RUDDER. LATERAL STABILITY WAS ACHIEVED BY A MANUALLY CONTROLLED CABLE ACTUATED CONTROL SYSTEM FOR ROCKING THE ENTIRE WING STRUCTURE, ANGULAR MOTION ABOUT THE LONGITUDINAL AXIS, EACH WING BEING DIFFERENTIALLY. THE WING AND RIB STRUCTURAL ELEMENTS WERE STATICALLY DETERMINATE AND THE JOINTS WERE STRENGTHENED BY WOOD BLOCKS AND ALUMINUM GUSSET PLATES. HOWEVER, THE TAIL SURFACES WERE COMPARITIVELY FLIMSY CONSTRUCTION. MAXIMUM SPEED 55 M.P.H.

THE MODELS I AND II FLEW IN 1908. THE MODEL I USED A QUADRICYCLE LANDING GEAR WITH WING WARPING FOR LATERAL CONTROL. MODEL II WAS SIMILAR EXCEPT A BICYCLE LANDING GEAR AND WING SKIDS WERE USED. MODEL III WAS SIMILAR EXCEPT TRIANGULAR AILERONS WERE USED FOR LATERAL CONTROL. MODEL IV WAS SIMILAR EXCEPT TRAPEZOID SHAPED AILERONS WERE USED. THIS TYPE WAS USED BY HUBERT LATHAM IN HIS FIRST ATTEMPT TO FLY THE ENGLISH CHANNEL. MODEL V WAS SIMILAR TO AND AN IMPROVEMENT ON PREVIOUS AIRPLANES. ON MODEL VI, WING WARPING WAS USED AGAIN AND KING POST TYPE WING TRUSS USED FOR WING BRACING. THE MODEL VII WAS USED BY LATHAM ON HIS SECOND ATTEMPT TO FLY THE ENGLISH CHANNEL. MANY "ANTOINETTE" TYPE MONOPLANES WERE USED BY THE FRENCH ARMY. "ANTOINETTE" ALSO DESIGNED AND BUILT THE FIRST LOW WINGED INTERNALLY BRACED MONOPLANE WITH A FAIRED CANTILEVER LANDING GEAR AND FUSELAGE. NO FURTHER PLANES WERE BUILT AFTER 1912. AT ONE TIME THESE AIRPLANES HELD THE WORLD'S DISTANCE AND ALTITUDE RECORDS. THE MAXIMUM AIR RANGE WAS ABOUT 100 MILES.

## Scale Modeling

(*Continued from page 27*)

broaches can be had from the diameter of a small pin to about .080 in. They are usually pentagonally cross sectioned. They are very useful in their main purpose of slightly enlarging small holes.

Laminated wood props of different woods were common to German aircraft of World War I and some 1910 to 1913 American ships as well. For museum models we need a very fine grain wood to match the original walnut or mahogany. I find the perfect combination in white holly and cherry wood. These woods are only available in craftsman's wood supply houses. You can find their advertisements in all of the "mechanics" magazines. Cut and sand the strips of alternate holly and cherry to a thickness of .020 in. and a width of at least 5/8 in. If the scale used is more than 1/24 full size, or 1/2 in. equal to 1 ft., these dimensions will have to be increased accordingly. Usually there are five strips of cherry to four of white holly, but here this factor depends on the job you are doing.

To glue the strips, hot violin glue is best, but good results may be had with a medium slow drying nitrocellulose or cellulose acetate cement. Whichever you use, line up carefully and put under pressure for at least eight hours. Lay out your blank and saw and carve in the usual fashion. For good work, both the diameter and pitch of the original prop should be scaled.

To find the correct width and thickness of the block (laminated or solid), a formula used by the old Illinois model aero club is still good. It is simply this:

$$\text{PITCH} = \frac{3.1416 \times \text{diameter} \times \text{thickness}}{\text{Divided by width of blank}} \quad \text{or} \quad P = \frac{ADT}{W}$$

Some of the finest wood craftsmanship is represented in early French and American propellers, and should be carefully reproduced in your model. Even with a solid cherry prop, you need to fill the fine grain with a good wood filler toned with stain to the proper shade, say a deep mahogany. After the filler and stain are dry, sand to a glass like surface starting with No. 320 "Wetordry" paper and dry finish with No. 600 paper. Apply six to ten coats of thin clear lacquer sanding with 600 paper between alternate coats. Lightly sand the last coat and finish with a good wax. This is one prop in which balance is non-essential.

For metal props the same pitch formula will hold true if you picture the blades as being made from a solid metal block. Since most metal props are round at the hub, you need a metal template of the blade outline from the tip to where it goes into the hub. Considering the scale you are using, select the proper diameter brass rod at the hub. Hold one end in an inexpensive drill chuck mounted in a handle. Now using a smooth steel anvil of some sort, and a flat faced hammer, beat out each blade to a rough outline. Remove all hammer marks carefully with file and fine emery cloth. Coat the rough blank with a blue metal dye such as "Dykem" and using a fine scribe, such as a needle in a pin vise, scribe around the metal template of the blade outline. Work to the correct outline by filing and finishing with Wed No.'s 400 and 600 paper. Machine the hub in a lathe, solder in the blades at the correct angle and after a final smoothing up, you are ready for the chrome finish. Don't try to chrome your own props. It is cheaper by far to take them to a good metal plater and let him do the job.

If there are any designs or painted tips on the prop, roughen the area to be painted with No. 400 paper. Apply a coat of clear lacquer and let dry. Now paint in the desired design, with pigmented dope or lacquer and let dry. Lastly, spray a light coat of clear lacquer over the whole blade assembly. If the

(*Continued on page 37*)

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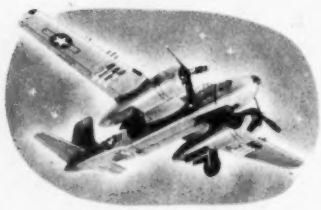

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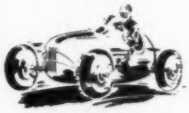
R4 Midjet, 85c

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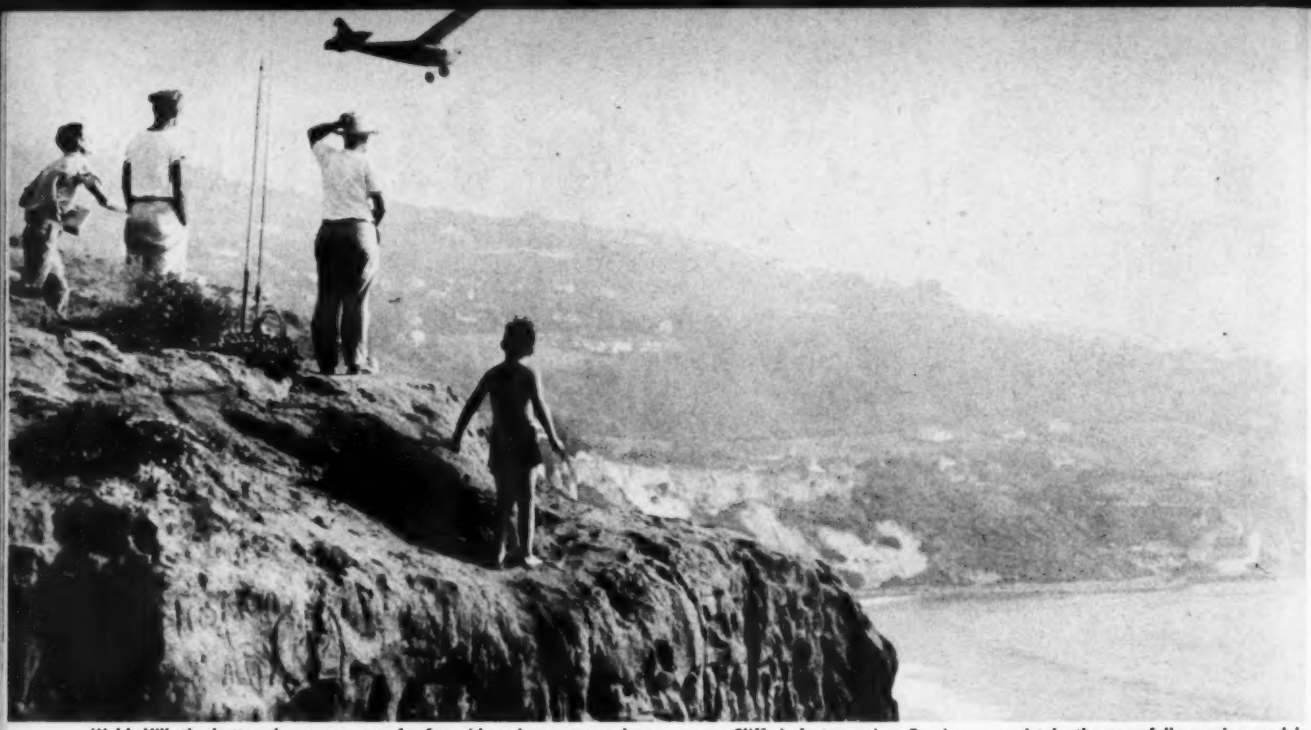
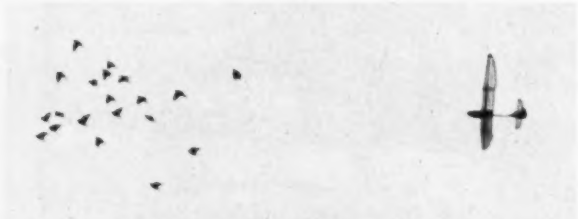


Webb Hill, the battery box man, goes for free ride, minus prop and gas. Enthusiasm for this kind of flying along the Redondo and Palos Verdes Cliffs is fast growing. Passing cars mistake the gracefully soaring models for full-size sailplanes. Flights last as long as you trust batteries.

# Silent Wings

By MARJORIE HUTCHEON

***Soaring radio controlled gliders, propless gas jobs off ocean cliffs — another California first.***



Jim Jensen's balsa buzzard scatters a flock of pigeons. Jim also has been known to pursue a nervous sea gull with this smoothly soaring ship.

Louis Culler, Webb Hill combine to launch Culler's 11-foot sailplane. Ship cruises at 25 mph, or 5 mph headway into the wind—45 mph downwind!

Hill's gassie glides silently by, converting other power pilots to this novel idea. Streak in picture is antenna of the hand-held transmitter.

weather is very humid, say 50 to 70 per cent, add one half teaspoon of castor oil to each pint of lacquer you use. This will prevent blushing of the finish. If severe blushing should occur, spray with one full teaspoon of castor oil to each half pint of lacquer thinner. This rule applys to both wood and metal finishes. When this is required, the drying time is increased from a few minutes to a couple of hours.

Some of the early airship and airplane props were brazed metal rod frames and single surfaced fabric assemblies. For models, simple wire and fabric assemblies suffice. Silk or nylon may be used for covering. Some wood props from 1909 to this date were and still are metal tipped. Early props used both copper and brass riveted and soldered in place. Later, brass was more widely used for its greater hardness, as it still is. Some modern props of wood are tipped with stainless steel. For tipping scale model props, shim brass, copper and stainless steel are obtainable from machinists' supply houses. You only need a small amount that costs very little. A thickness of only two or three thousandths of an inch is all you need.

To make a metal tip, copy the original shape, place a piece of the shim on the end of a scrap piece of metal and apply a few seconds of flame from a torch to the opposite end of the scrap piece. To anneal or soften shim stock, never use the alcohol flame on the stock itself. Tin the under side of the pieces cut for the tips and shape to the blade with any handy polished metal tool such as a center punch shank. Cut away a little of the wood if need be to get a smooth fit, and using a small soldering iron, carefully solder to form the curved "V" section usually required. If it is carefully done, no solder will show on the outside of the seam.

When metal tips are required, put them on right after the filler coat. After polishing the metal, hold tips in place with a drop of model cement, and then apply finishing coats of clear lacquer to the entire blade. Thread the end of the prop shaft and make a nut to fit it. Check the number of bolts in a wooden prop and locate hole centers with fine dividers. Drill with a size of drill to match the bolts you use.

Make your hub bolts by filing hex heads on small pins. Thread the pins on the jewelers screw plate and make small nuts to match. Optical supply houses sell a fine steel tubing called capillary tubing only 1/32 in. in diameter. This tubing has many uses in fine model work. You can make tiny castellated nuts by shaping a small length, say 1 1/2 to 2 in., to a hex shape using a fine file and magnifying glass. Cut to length with a fine tooth blade in a jeweler's hack saw, remove saw burrs, and tap with a tap made from a broach. Before being cut to length, the castellations are simply shallow cuts made with a fine tooth saw under a magnifying glass. Here used with very thin metal hub plates, this makes realistic detail on wood props. Follow the same attention to detail on metal props with the spinner cap made from solid brass roughened to take a metal primer.

In making detailed engines of metal, get all the pictures and dope you can before starting. You can do very well with a lathe, drill press, small grinder and a lot of elbow grease. Small shapers and milling machines are good, but not essential. You need only make the engine parts exposed to view, or you can make a perfect scale model of the engine itself. This is needed on early and most World War I jobs.

Building models of balloons and airships is a subject having its own specialized tricks. Here, the scale often determines the methods used. Where possible make two halves of quarter-inch Lucite or Plexiglass as shown. Don't worry if some crazing occurs because the assembled sides will have to be rubbed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# design detail

## Engine Mounts

By H. A. Williamson

FIG. 1

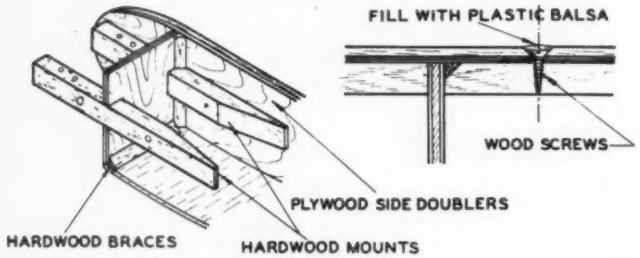



FIG. 2

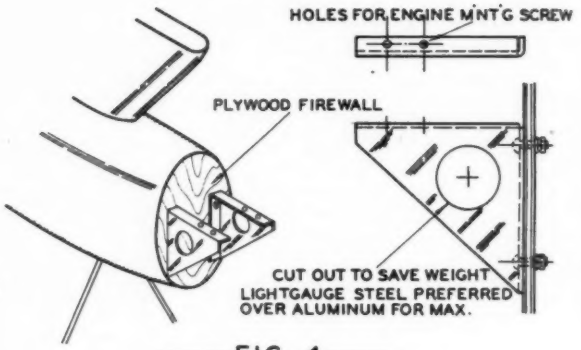



FIG. 3

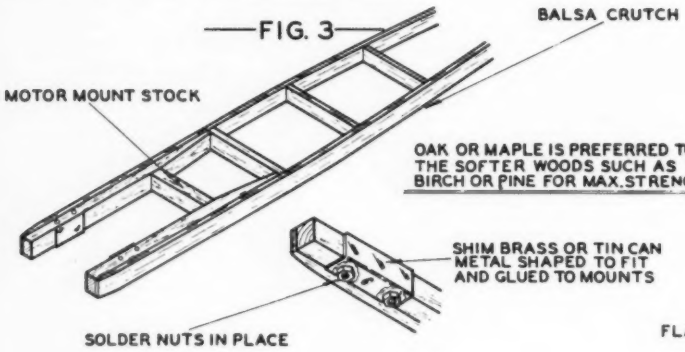

BALSA CRUTCH
MOTOR MOUNT STOCK
OAK OR MAPLE IS PREFERRED TO
THE SOFTER WOODS SUCH AS
BIRCH OR PINE FOR MAX. STRENGTH
SHIM BRASS OR TIN CAN
METAL SHAPED TO FIT
AND GLUED TO MOUNTS
SOLDER NUTS IN PLACE

FIG. 4

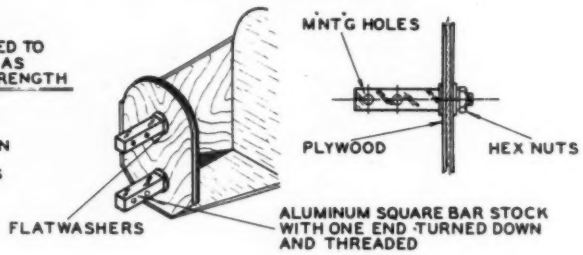
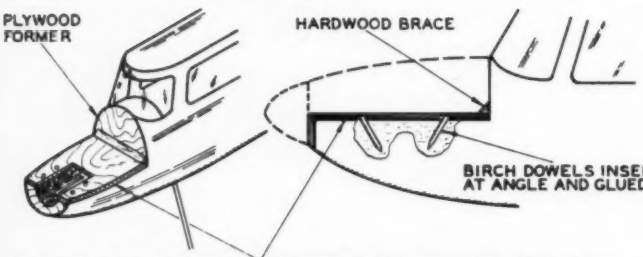
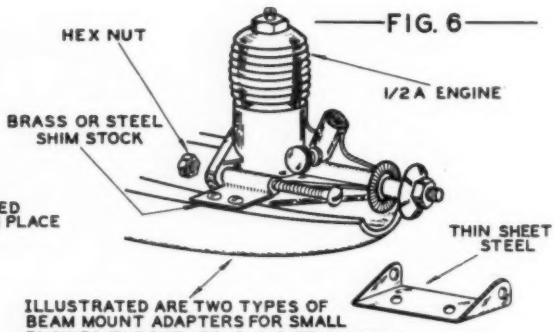



FIG. 5



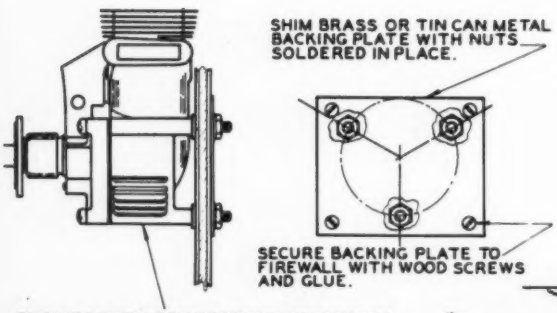

PLYWOOD PLATE TYPE OF BEAM MOUNT OFFERS SOME ADVANTAGES OVER THE MORE CONVENTIONAL MOUNTS EASE OF ALIGNMENT AND CONSTRUCTION REPAIR AND REPLACEMENT IS ALSO SIMPLIFIED

FIG. 6



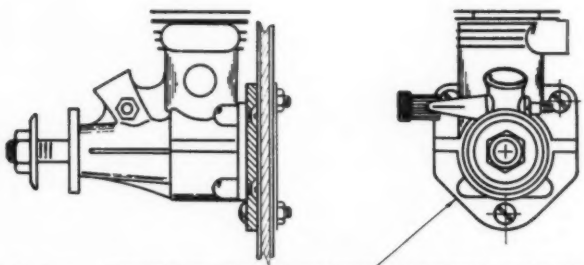

ILLUSTRATED ARE TWO TYPES OF BEAM MOUNT ADAPTERS FOR SMALL ENGINES THE ONE ABOVE IS PARTICULARLY SUITED TO ENGINES LIKE THE WASP WHILE THE DESIGN AT THE RIGHT WAS DEVELOPED FOR THE THERMAL HOPPER AND SIMILIAR ENGINES.

FIG. 7



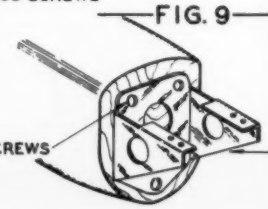

ENGINES WITH PROJECTING CRANKCASE BOLTS MAY BE FIREWALL MOUNTED IN THE MANNER ILLUSTRATED ABOVE.

FIG. 8



ENGINES WITH REAR CRANKCASE COVERS LIKE THE FOX 29 AND 35 CAN BE READILY CONVERTED TO RADIAL MOUNTING BY MAKING AN ALUMINUM PLATE AND REPLACING THE REAR COVER SCREWS WITH FLAT HEAD MACHINE SCREWS.

FIG. 9




AN ADAPTER FABRICATED FROM THIN SHEET STEEL CAN BE FABRICATED AS SHOWN FOR ADAPTING SMALL ENGINES SUCH AS THE CUB .099

H.— WILLIAMSON

with 320 grit paper first, then sprayed with a lacquer primer. Be sure to incorporate some form of hanging bracket before closing up the sides. Two brackets are required for dirigible models. For larger models, or even some smaller ones, the use of half inch celotex board in layers works well. After smoothing, give it two coats of heavy airplane dope and two coats of pyroxylin auto body filler. Sand smooth and finish with proper color coats and clear lacquer finishing coats.

Balloon baskets are best made of woven soft iron wire metal primed and sprayed a medium cream color. Any Boy Scout handbook on basket weaving will show you the procedure. All you do is simply apply the principles to a tiny subject. Nettings for early airship models are of the proper scale size mesh fish net found in sporting goods stores and sold by the yard. Spherical balloon nettings are different and tricky to lay out and make. See sketch.

At this point I would like to touch upon the framework of silk or nylon covering on metal framework. On early airships and airplanes the outline of the framework could be seen through the fabric. Some frames were only covered on one side with the spars and ribs in pockets. Some planes and airship rudders had their leading edges reinforced with an extra layer of cloth. This gave an odd shading in strong sunlight.

After you check each soldered joint and fitting, dope the metal framework with two coats of heavy aero dope. Cover this with light tissue in the same way you would for a flying model and water spray. When it is tight, dope on a leading edge strip of the proper color nylon or silk if required, before going farther. I prefer nylon as it works more easily, but silk is fine to use. Have the fabric pieces cut to size, allowing a little extra at the edges and dope on over the paper. Two or three coats of dope consisting of two parts regular dope to one part thinner will do fine on light framework. Where the strength of the structure permits, use more dope.

The color of the fabric is important. The ship in which Bleriot flew the Channel in 1909 was a pure white silk with a slight sheen. Don't overdo the gloss. Not all early ships glistened in the sun. All Wright planes were flat white muslin covered. Some of the early Farmans, Voisins and others used a light tan or cream colored fabric. Curtiss in 1909 and 1910 used a golden yellow varnished silk covering. The same applies to early airship control surface covering, and only to a minor extent to the gas bag itself. By 1910, all Zeppelin airships had their huge hulks painted aluminum to reflect the heat of the sun. Capt. Thomas S. Baldwin, one of flying's all time "greats," had his "Red Devil" airplanes covered with a carmine rubberized fabric of his own invention. In damp weather, this fabric would sag and reduce the lift of the wings quite a bit.

The planes built by Tom Benoist at Kinloch Field in St. Louis County were masterpieces of craftsmanship. He was one of the first men in flying history to use a dope like our present one and his ships were first covered with white silk which never lost its tautness. Every part of his planes was smooth and glistened even on dull cloudy days. He and other Kinloch pioneers began using NAID cloth, a mixture of cotton and linen, by 1912. This was a medium cream color and doped to a high gloss.

Never use spar varnish of any kind on museum models. I have tested all known brands and find good lacquer superior to any varnish. For one thing, varnish will turn color after years in glass cases, while lacquer may dull up a bit, but remains the same color year in and year out. Examples of this kind are found in some Chinese lacquered objects that are hundreds of years old.

(*Continued on page* 42)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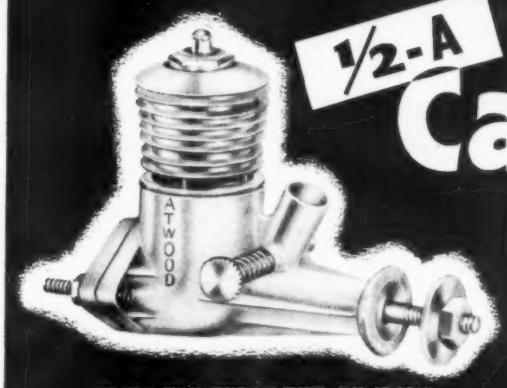


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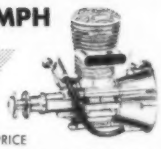

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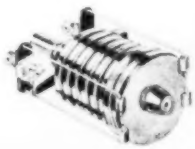

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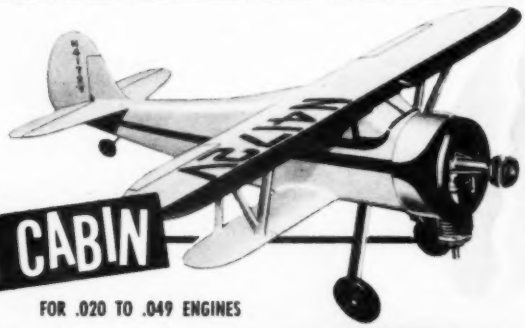

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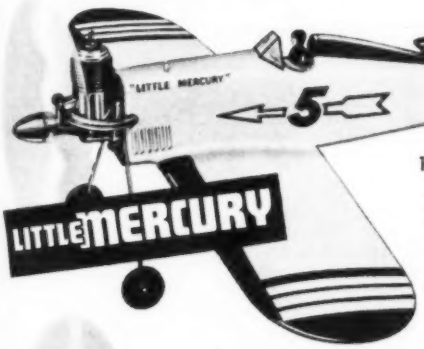


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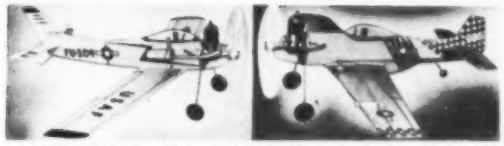

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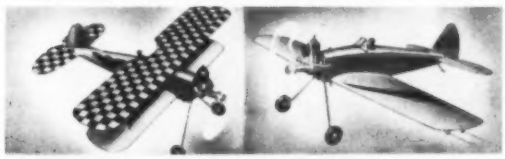

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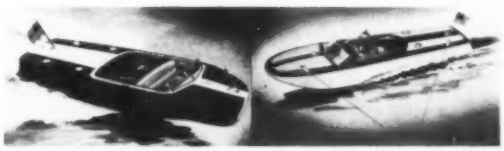

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Since a museum model must depict some phase of history, there are other factors besides the aircraft itself that must be considered. There is the matter of adding scale models of the pilot or crew as the case may be. A simple method of modeling the human figure is shown. Of course you can carve wooden figures if you wish. When it comes to fine detailing of the features or fine painting of letters and numbers, here is a good plan to follow. In good light and thoroughly relaxed, practice making short, straight and curved lines between the beat of your pulse. On work of this sort, flat oil paints are best as lacquer looks like an oily skin. You need a fine sable brush with only a few hairs. It costs about 40¢. Use this for the eyes, eyebrows and mouth. A little larger brush is needed for blending the colors in the face and hands. Work expression into the features by a little practice. Art stores carry helpful books on sketching, cartooning and figurine painting for about a dollar each. Red sable brushes cost a little more than others but are the cheapest in the long run. Clean them as soon as you stop painting, even if only for a few moments. Before putting them away for your next project, clean with lacquer thinner to which a few drops of castor oil has been added, wash with very mild soap in lukewarm water, dry and lastly work a drop or two of olive oil into the base and out to the tip. Some of my red sable brushes are 10 years old and look as good as new.

Have you ever heard of "half models" or bas relief models? These are pictures with partial models used to give depth in a small place. In a "half model" project, the right wing panels are tinted photographs or paintings, for example, while the left wing assembly fuselage and left side of the tail group are modeled carefully at a smaller scale than for complete models. Bas relief jobs are restricted to carefully chosen and limited subjects—for example, a balloon or airship over a city. Depending on size, perspective, etc., the aircraft need only be from 1/8 to 1/4 in. thick.

Great care must be exercised in such projects with careful attention to perspective. In "half model" projects, the rectangular wings of a plane may slightly but correctly taper at the point where they merge with the flat picture. Also, the picture frame should be from two to three inches in. thick, depending on over-all size. Here, the picture must be curved from the center to each side to create more depth. The bottom, but not necessarily the top, should taper slightly toward the horizon line or "vanishing point." Data on stage scenery painting and puppet theaters available at your library will assist you in the layout and coloring of these little wall scenes.

I have experimented with the idea of "flying dioramas." Here the idea is to create the illusion of motion when the subject is hung in a case with a sky and cloud background. As an example, I have a model of the 1854 Giffard airship made to a scale of 3/16 in. to the foot. It is in the St. Louis Academy of Science along with other models I have made. In this project, a row of varicolored pennants runs along the gas bag, and Henri Giffard tended a steam engine and the airship controls from his crude nacelle. To give "motion," I made the tiny pennants of shim brass, and bent them to look as if they were fluttering in the wind. "Smoke" from the steam engine smoke stack is a bit of fine steel wool dipped in lacquerer primer, then carefully touched with blue-black, and fine tones of grey to white. Use an artist's air brush for this. The rigging is also irregular, as though it were being whipped by the wind. Actually, Giffard, with only a 1-1/2 hp engine, flew at the terrific speed of six miles an hour! This didn't even blow his stove pipe hat off or muss up his goatee.


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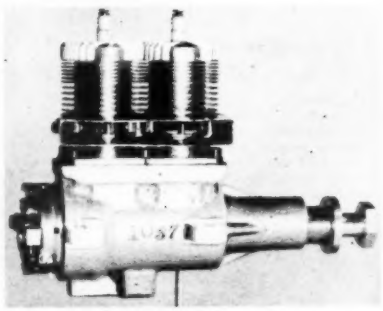

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In the Institute of Aeronautical Sciences in New York, I have a diorama of the first successful powered flight of man. With limited space and no sky background at the time, I built this project and have sought other means to add to it. The postmaster at Kitty Hawk, who witnessed the flight on Dec. 17, 1903, sent me 10 lb. of sand from the exact spot where the plane took off on that memorable Thursday morning half a century ago. The sand was dried and mixed with cellulose filings, which in turn was mixed with acetone, castor oil and regular airplane dope. A small test amount was first made and checked for adhesiveness, flexibility and color when dry.

The detailed starting rail was imbedded in the sand and other details added: footprints around the plane and rail, small bench with a "C" clamp hung across it, grease can and stick near the starting rail, besides the figures of the Wright brothers. These figures are of maple with the hands of soft copper. Study the human hand. The palm and fingers can be thickened by careful application of solder with a "pencil" tipped iron. In this way the fingers can be bent around the controls. Orville Wright told me in one of our brief meetings that Wilbur "was a little nervous" and that they both felt the cold, biting wind. "Wilbur's" free hand is in a nervous gesture and I tried to show the effects of the cold and strain in coloring their faces.

In building dioramas a valuable manual on plaster modeling for aircraft is available. Write to the Industrial Division, U. S. Gypsum Co., 8032 Forsyth Blvd., St. Louis 5, Mo. It is excellent for model makers and aircraft workers engaged in making plaster forms and patterns in the manufacture of today's aircraft. My copy was free, but there may be a slight charge to those outside the aircraft industry.

Another good handbook on making small scenery applicable to small dioramas is one put out by the Lionel Co. for model train enthusiasts. I believe there are a couple of other similar books, but I don't remember the publishers. You will find in such books data on the use of twigs, dried coffee grounds, and Lord knows what all. One idea I have used for small grassy patches is this one: cement to your base a piece of an old worn turkish towel. Trim it in irregular fashion with a scissors, as wild grass isn't uniform in height. Next, add some very thin patches of gypsum here and there and let dry. Now take a wire brush and slightly roughen up the grassy sections. Roughen lightly the gypsum patches with No. 2 sandpaper. Spray on light, medium and dark flat oil base paint of the wall and ceiling variety. Daub in different browns of the same material on the gypsum patches to simulate muddy or barren patches of earth.

In ferreting out historical aeronautical facts, exact names, dates, places and details of events, use great care to preserve the truth.

New ways of modeling are always coming up and new suggestions are welcome. I hope the serious modeler will get some help out of my humble effort. END


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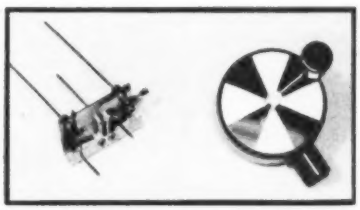

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# FOREIGN NOTES

***Beginning a monthly world-wide round-up of technical developments, designs, and significant products.***

## By P. G. F. CHINN

**Catapult Launcher for Speed Jobs**

Australian ex-record-holder, Herb Henke, has developed a catapult launching gear for speed models. Outfit is about a yard long and launching cradle runs on a steel rail inclined upward at about 12° to ground level. A bit tricky but it works.

**World's Smallest Production Motor**

Clear cut claimant to this title is new British Allbon Diesel of 0.1 cc—i.e., a displacement of only .006 cu. in., or less than one-third that of K & B's Infant Torpedo. Built by Davies Charlton, Ltd., who also make the bigger, Class B, D.C. 350 engines, new Allbon resembles .03 Allbon Dart already known in U.S. Weighing only 5/8 oz., motor is a shaft valve, 360° port job. Compression screw has knob on top instead of lever necessary for bigger engines.

**Unusual Motor from Russian Zone**

New East German .15 cu. in. Wilo Diesel has unique form of induction, consisting of a front disk valve. A pioneer British front disk rotary valve (Westbury, 1937) had a rotor disk interposed between crankweb and the front of the crankcase. Wilo disposes of a separate component by utilizing the actual crankweb as the valve disk. Contact between valve faces is maintained by special spring washer between prop driver and nose of main bearing, assisted, when engine is coupled to a normal tractor propeller, by thrust. Intake is a short inclined tube cast in the front of the crankcase below the main bearing, which scoops mixture direct into the case without the acute turn necessitated by normal shaft valves.

**A new Allbon Diesel, the smallest production motor in the world. It displaces only .1 cc.**

Examples of this engine which have gotten through the Iron Curtain can probably be counted on the fingers of one hand and we rate ourselves lucky on having managed to get hold of one for a test. Our impressions:

Engine is very compact and, as European .15's go, light in weight, (3 1/2 oz.). Finish does not compare favorably with modern Western practice. Power was good but, as expected, out-of-balance shaft (from segment cut out of crankdisk for intake timing) caused a degree of vibration which would be totally unacceptable by U.S. modelers.

**New Aussie RC Equipment**

Radio control pioneer Gil Miles of New South Wales (he has been building and flying RC for seven years but has previously turned down commercial propositions) discloses that he has a complete new outfit that will be on the Australian market for 1954. Made in Melbourne, equipment is to be known as Kontrol-master and will be put out fully assembled and wired. The receiver is a two-tube circuit and comes wired up to potentiometer, switch and meter sockets, so that all the purchaser has to do is connect batteries on one side and escapement on the other.

Kontrol-master transmitter uses single 1 1/2-volt "A" battery and 90-volt "B" supply. Escapement is a compound, four-position type resembling the Bonner; responds to one, two and three pulses and has auto safety position. Entire gear is claimed to be non-critical and eminently suitable for the non-radio-expert model builder.

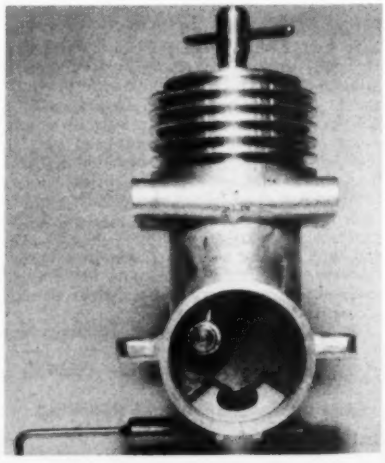
**European Reaction to Mac Diesel**

Trade importations of U.S. engines in most countries of Europe is prohibited by "luxury imports" restrictions, but general reaction in Europe to the first of America's new Diesels, the McCoy .049, can now be judged from reports on individual importations.

First published report appeared in British "Model Aircraft" magazine, gave full marks to the Mac on performance, compact design, light weight, and found that its unique plastic compression ring gave better seal than the normal European ground and lapped contra piston. Starting was likened to British 1/2-cc Diesels: easy although not instantaneous. "Aeromodeller" magazine found starting very easy. On the other hand, a leading German engine manufacturer thought that starting was too critical but praised general workmanship and finish.

First reaction from contest men came when your reporter loaned his own McCoy Diesel to British team racing enthusiast Kit Milford for the widely (*Continued on page 45*)

**Something new for the books, a front disc rotor, the East German Wilo .15 cu. in. Diesel.**



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attended Team Race Rally held at Cambridge, England on August 9. In the Half-A class, in competition with motors from .03 to .06 cu. in., the .049 McCoy powered racer proved fastest ship at the meet, lapping at 50-51 mph on 30 ft. lines. This compares with 45-50 mph for Allbon Spitfire .06 engined models (a powerful motor but relatively heavy) and 35-40 mph for Mills .045's and E.D. .06's. Latter two engines, however, have a big advantage in low fuel consumption and, on this occasion, the Mac was beaten by one of these which flew non-stop. All in all, however, it was agreed that, with practice, the McCoy's extra performance would eventually overcome pitstop handicaps. In actual race, the Mac was lapping slower ships every four circuits.

**Italian Super-Tigre Range Increased**

Latest additions to the well known Super-Tigre range produced by Micromeccanica Saturno of Bologna, Italy, include the G.23 Diesel and the G.24 glowplug .60. The G.23 is a 2.5 cc (.15 cu. in.) unit which supplements the already internationally known .15 cu. in. G.20 glowplug model. The G.24 is a racing engine, two prototype units of which made an encouraging start when, flown by Fanoli and Fiorini, they put identical times of 145.55 mph to take third place in the '53 World Speed Championship.

**Outstanding German A-2 Glider**

Leading German A-2 exponent, Max Hacklinger, has come up with some interesting observations and a new variation on his well known pod-and-boom layout, "Urubu," (second place, 1952 World Championship and frequent contest winner).

The new model (M.P.-11) uses same fuselage length, the pod being entirely in front of the wing and boom of triangular section, but flying surfaces have been entirely changed. Wing span is increased by almost two feet to 94.5 in., achieved by the use of a very high aspect ratio (19.2 against 11.4), slightly greater wing-area (now 465 sq. in.) and correspondingly less stab. area (only 13.3 per cent). To preserve rigidity, wing is sheet balsa covered on top surface.

M.P.-11 uses a round spun-cotton thread turbulator located 1/8 chord in front of the leading edge. This change-over from previously used Wortmann wing-section of semi-laminar-flow characteristics has resulted in appreciably lessened sensitivity to bumps and gusts present in strong thermals, says Hacklinger. He estimates that sinking speed has been improved by 1.5 cm./sec.—just over three feet per minute, a modest claim which reflects the steadily diminishing sources for substantial improvement in A-2 durations and our evident proximity to the ultimate for any given set of conditions.

Unlike Hacklinger's earlier model, which had a symmetrical stab. section, his H.13 section on M.P.-11 is undercambered. The stab., declares Hacklinger, is a most important factor contributing toward performance and it has been found, through tests, that the nose radius of the stab. is a satisfactory means of controlling the stalling point. The model is flown with the towhook (50 per cent) and center of gravity (60 per cent chord) permanently fixed and the "stall frequency" adjusted by sharpening or rounding off the nose of the stab. section.

**Dynajet Powered RC**

Bruce Hearn of Hearn's Hobbies, Victoria, Australia, has Dynajet powered radio job. Ship is a large high-mid-wing; has rectangular section fuselage, parallel chord wings, twin fins and rudders. Dynajet is mounted above the fuselage over the center of gravity. Bubble canopy immediately in front hides gas tank.

**New Norwegian .06 Diesel for '54**

To supplement Norway's well-built .15 cu. in. D-A Diesel, designer-manufacturer Jan David-Andersen tells us he will introduce a new .06 cu. in. (1 cc) model. END


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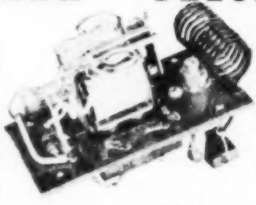

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## Hep On Nordic???

(*Continued from page* 21)

is somewhat separated from the other models plotted and we will therefore omit this design from our present analysis. If we start by taking the model with the next longest tail moment, Dick Everett's El Nordo II, we see that this model has a relatively high stability factor. It has a moment-arm of 35 in., about 18 per cent more than Gunic's B.G. 44 despite 35 per cent more stabilizer area. Aspect ratio and wing section play no part here since El Nordo's aspect ratio is actually higher than on the Yugoslav model, while the Gottingen 602 section used is not regarded as needing such a high stabilizing force as the now commonly used thin, highly under-cambered group of sections which, for want of a better name, are referred as "bird" sections.

At the other end of the scale we have Janiaud's Milou III which, for a 26 per cent stab area, has the exceedingly short moment-arm of 18 1/2 in. However, the aspect ratio is relatively high at 11.9, although the section used is of average A-2 characteristics.

Of comparable specification, too, is Arne Hansen's Danish model. This A-2 has a slightly higher aspect-ratio than the model previously mentioned (actually the highest, at 12.03, of any of our 10 examples) but its tail moment is only 22 in. for a 23 per cent stab. area. Although this is in marked contrast to some of the later Continental designs, it is worth mentioning that Hansen's design dates back some three or four years and has, during this time, recorded some high times in international contests, including the World Championship series. Any argument suggesting that a long tail moment was essential to modern A-2 design would, in fact, be shot to bits by the performances of the Northern European designs, most of which have, to date, used relatively short tail moments.

The two German designs, by Max Hacklinger and Ludwig & Horn, respectively, are interesting, both being representative of a present trend, in German A-2 design, toward pod and boom layouts. The former design placed second in last year's Championship and differs from the other German model in having a higher aspect ratio and much smaller stabilizer, with slightly longer tail moment. Both models use thin, highly undercambered wing sections, especially Hacklinger's. The latter model, like Czepa's Toothpick, uses plain vee dihedral, whereas most A-2 designs favor tip or polyhedral layouts. This German model has also been seen equipped with a turbulator and was, in fact, so fitted when flown in Austria last year during the Championship.

As regards fuselage design, the bulky cabin types which were popular before towliners reached their present contest status have, of course, almost entirely disappeared, but, although it is now generally appreciated that a slim, well-formed fuselage is desirable in the interests of drag reduction, the methods of achieving this are much less uniform.

The pod and boom layout undoubtedly has much to commend it, for it can be made to have a minimum of wetted area while still conforming with the cross-section rule. Its only serious disadvantage is in the weakness of the boom and the fact that, if a particularly long tail moment is being used, it is possible for the boom to warp out of alinement and upset trim. (Czepa had this trouble in the 1952 event.)

Both these problems can be overcome by good design and a well constructed boom—or even a tubular alloy boom—but it is rather necessary to keep an eye on possible weight increases, especially if the design calls for a fuslage length of 60 in. or more. Some Continental exponents use thin aircraft plywood for the boom, making this of a triangular section.

The conventional box type fuselage structure is still used by quite a few modelers, particularly in Britain. A model with this type of fuselage and of conventional (i.e., medium length) design can, of course, be built well within the 14 1/2 oz. weight rule demanded under the A-2 formula. There are two schools of thought in regard to making the model meet the weight rule. One, and the more common, is to strengthen the structure, possibly by partial use of sheet covering. The other is intentionally to keep the structure as light as is consistent with adequate strength and then to add weight close to the center of gravity to bring it up to the required 14 1/2 oz. Theoretically, of course, the latter method is better from the stability angle.

Usually, with a model of fairly normal dimensions, we find it best to build according to accepted practice, making use of the extra weight allowance to strengthen or improve where deemed necessary and then to add any extra weight required (usually an ounce or two) in a suitable compartment below the wing mount. At the same time, care is taken not to accumulate excess weight toward the wing tips or at the extreme tail end of the fuselage.

As far as the general fuselage shape is concerned, we feel that an acceptable compromise is reached by the design used in the Anglian A-2. This is virtually a combination of pod-and-boom and conventional design. It is very strong and rigid, is simple to construct and readily lends itself to a high finish. The actual profile shape, incidentally, was arrived at after considering means of reducing frontal drag as well as wetted area.

In laying out a fuselage shape, one does not generally consider the angle at which this is inclined when the model is gliding. Normally, the wing is set at an angle appreciably less than the angle of attack during the glide. This means that the fuselage may be inclined at a positive angle to the airstream amounting to, perhaps, 5°, and therefore causing unnecessary drag.

In designing the Anglian, therefore, the "approach angle" was, in effect, built in; first by increasing the wing and tailplane angles of incidence and, secondly, by tapering the fuselage toward the tail on the underside only. In this way, the actual fuselage frontal area presented to the airstream, during the glide, should be no greater than the actual cross-section shown in the three-view drawing. Observation of the model in flight on a calm day, as it approaches the ground, would appear to confirm this. The cross-section chosen was a narrow inverted triangular shape, the regulation sectional area being reached at the leading edge of the wing where the rounded front decking merges into the upper surface of the center-section. Behind the wing, the fuselage assumes a normal triangular section.

The construction is very simple, consisting of two 3/32 in. sheet sides with two 3/16 in. sq. longerons and a 1/4 in. keel and suitable formers. The front decking was originally planked but carved block balsa would do just as well. All gliders need a hardwood noseblock and we chose a piece of walnut for this, which takes a high finish beautifully and remains unmarked after almost any sort of collision.

It was about 18 months after the original Anglian had been built and flown successfully in a couple of contests that we had, in reply to a request for his comments on future design trends, a letter from Ossi Czepa in Vienna in which he outlined possible means of improving on the glide of his basic Toothpick design, including the aforementioned method of "building-in" the gliding angle.

As far as "still air" or "fair weather" A-2's

are concerned, it would appear difficult to improve on Toothpick, but Czepa makes the following observations. (We quote from his letter, keeping as near as possible to his original words.)

"After recognizing that our airfoils are nearly perfect, there remains only the question of how to minimize the drag. I have shown this with my Toothpick. Finer points here are a round section and thinner fuselage. The next thing can be to mount the wing at its flying angle on the fuselage so that we eliminate some of the frontal drag."

Regarding induced drag: "Here an elliptical planform and greater aspect ratio does help. Toothpick has an aspect ratio of about 10 : 1. I believe 15 : 1 or even 20 : 1 could do much. But only with an extra finely worked airfoil."

At the beginning of this article we said that the best type of A-2 on which to concentrate for a start was a compromise design in which we would forego optimum still-air durations in favor of a better all-around performance. Let us, therefore, summarize the characteristics of such a model.

A medium aspect ratio of about 10 is suitable. A chord of 7 in. with tapered outer panels then gives a span of about 65-66 in. for a 425-430 sq. in. wing. A stabilizer area of 22-23 per cent of the wing area is required and the tail moment should be about 4 1/2 wing chords measured from the center of gravity to 50 per cent chord of the stabilizer.

With these figures, a medium thickness section with a fair amount of undercamber can be used, such as the MVA-301 with increased undercamber (as used by Gunic), the Benedek B-8306 and B-8356 and certain of the Sigurd Isacson sections.

Nose moment length does not appear to be very critical despite the fact that some authorities have been rather emphatic about it. The 1951 Championship winner, for instance, had about the longest nose moment of any A-2 (23 in.) while the 1952 winner had just about the shortest: 8.4 in.! Generally speaking, a nose moment of not more than half the tail moment is about right for an all-weather model and will place the CG about right without resorting to an excessive amount of ballast.

Dihedral with a towliner does not need to be as great as with other types, although the tendency with long fuselage designs (examples: Czepa and Hacklinger) is to use up to 10° in a vee form. Most Continental A-2's use only tip dihedral, or a poly layout with a very shallow inner angle. Opinion as to whether the stab should be dihedralled is about equally divided for and against, as it is in the case of underslung fins.

Actually, of course, under FAI rules, there is less occasion to feel anxious about the amount of lift which may be lost through the flying surfaces being dihedralled, since area calculations are based on *projected* area: i.e., the area covered by the surfaces when viewed from directly above regardless of the dihedral angles at which the surfaces are inclined. You are therefore entitled to base your total area on this projected area and not simply to keep within the 525 sq. in. allowed on actual area alone. Both the 1951 and 1952 winners, in fact, substantially exceeded the 525 sq. in. actual area, while still coming just within this figure for the projected area. Czepa's model, for instance, had 467 sq. in. actual wing area, which was just about 15 per cent more than the average A-2 in 1951. Strangely enough, most builders continue to base their areas on actual dimensions of the components. This does, however, insure that one is well within the rules and unlikely to meet with trouble at the processing tables.

A dethermalizer is, needless to say, essential. The most popular type is the pop-up stab. fuse operated and is to be found on


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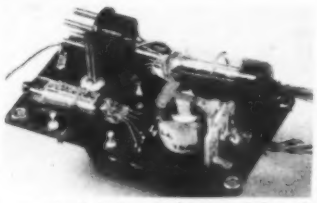

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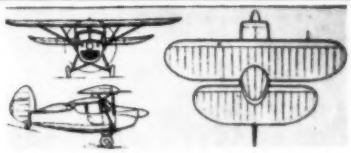

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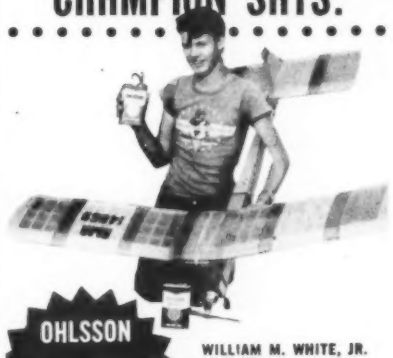

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## DESIGN DATA — NORDIC A2 GLIDERS

| DESIGNER AND COUNTRY OF ORIGIN | R. JANIAUD (FRANCE) | HORN & LUDWIG (GERMANY) | A. HANSEN (DENMARK) | M. HACKLINGER (GERMANY) | B. GUNIC (YUGOSLAVIA) | W. FARRANCE (GT. BRITAIN) | R. EVERETT (U. S. A.) | O. CZEPA (AUSTRIA) | J. CHINN (GT. BRITAIN) | G. BYRD (GT. BRITAIN) |
|---|---|---|---|---|---|---|---|---|---|---|
| MODEL— | MILOU III | FLAMINGO | 3RD., 1951 CHAMPIONSHIPS | 2ND., 1952 CHAMPIONSHIPS | B.G. 44 | HELIOS | EL NORDO II | TOOTHPICK | ANGLIAN II | 1953 BRITISH ELIM. WINNER |
| WINGSPAN, IN. | 70.5 | 61.2 | 71 | 70.9 | 66 | 63 | 65.25 | 67 | 66 | 62 |
| WING AREA, SQ. IN. | 416 | 408 | 419 | 439 | 445 | 407 | 424 | 458 | 428 | 430 |
| STAB. AREA, % OF WING | 26 | 27 | 23 | 18.5 | 17.5 | 29 | 23.6 | 14.6 | 22.5 | 19.9 |
| TOTAL AREA, SQ. IN. | 524 | 518 | 515 | 520 | 523 | 525 | 524 | 525 | 524 | 515.5 |
| WING PLANFORM | PARALLEL TAPERED TIPS | PARALLEL TAPERED TIPS | PARALLEL ELLIP'C TIPS | PARALLEL TAPERED TIPS | PARALLEL TAPERED TIPS | PARALLEL TAPERED TIPS | PARALLEL TAPERED TIPS | PARALLEL ELLIP'C TIPS | PARALLEL TAPERED TIPS | PARALLEL TAPERED TIPS |
| WING ASPECT-RATIO | 11.9 | 9.18 | 12.03 | 11.4 | 9.53 | 9.75 | 10.04 | 9.66 | 10.01 | 8.94 |
| WING SECTION | —— | —— | OWN | EXTRA THIN CZEPA TYPE | MVA. 301 | ODENMAN | GOTT. 602 | CZEPA | MVA. 301 | CMGPA |
| DIHEDRAL FORM | POLY | TIP | POLY | VEE | TIP | TIP | TIP | VEE | POLY | TIP |
| DIH. ANGLE, INNER | 2 DEG. | —— | 5 DEG. | 10 DEG. | —— | —— | —— | 10 DEG. | 5 DEG. | —— |
| DIH. ANGLE, OUTER | 20 DEG. | 27-1/2 DEG. | 12-1/2 DEG. | —— | 30 DEG. | 26 DEG. | 22 DEG. | —— | 20 DEG | 30 DEG. |
| OVERALL LENGTH | 32.25 | 52.36 | 36.6 | 56.3 | 40 | 47 | 54.62 | 78.5 | 42 | 45 |
| C.G. LOCATION % OF CHORD | 50 | 58 | 50–60 | —— | 50 | 55 | 50 | 43 | 55 | 70 |
| NOSE MOMENT, IN. + | 9.75 | 19.25 | 11.5 | 18 | 8.4 | 13.6 | 17 | 23 | 13 | 14 |
| TAIL MOMENT, IN. + | 18.5 | 29 | 22 | 32.5 | 30 | 31.25 | 35.3 | 50 | 27 | 28 |
| FUSELAGE TYPE | STREAMLINED | POD & BOOM | DIAMOND CABIN | POD & BOOM | STREAMLINED | BOX | TRIANGULAR | STICK AND REAR POD | INVERTED TRIANGULAR | BOX |
| WING ANGLE OF INC. | + 2 DEG. | + 3 DEG. | + 5 DEG. | —— | + 5 DEG. | + 4 DEG. | + 3 1/2 DEG. | + 3 DEG. | + 6 DEG. | + 3 DEG. |
| STAB. ANGLE OF INC. | – 1 DEG | 0 DEG | 0 DEG. | —— | + 1 DEG. | 0 DEG. | 0 DEG. | 0 DEG. | + 3 DEG. | 0 DEG. |
| UNDERSLUNG FIN ------ | YES | YES | PARTLY | PARTLY | NO | YES | NO | NO | YES | YES |
| DIHEDRALLED STAB:--- | NO | YES | NO | YES | NO | NO | NO | YES | YES | NO |

+= MEASURED FROM C.G. TO 50% ROOT CHORD POINT ON STAB.

practically all types of A-2's, with the exception of a few of the very long fuselage types using very small stab. areas and on which a parachute D/T is used. Czepa's Toothpick did not use a pop-up stab., but whether this was because it was not considered effective, or because of the complication arising out of the unusual tail end structure with its tail-pod, is not known. The pop-up stab., however, is effective enough with stabilizer areas of down to 20 per cent. Incidentally, if a dihedralled stab. is featured, it is essential to provide a firm mounting which will not allow the stab. to slew sideways in the D/T position, otherwise the model will tend to spiral down instead of descending on an even keel.

Little need be said about the general construction of the A-2 towliner. Modern structural methods are fully applicable to this type of model and the constructional features employed are largely a matter for personal choice. If the fuselage is of moderate dimensions, there is a good case for making it of all-wood construction and, better still, covering the sheet balsa skin with silk doped on. This makes a tremendously strong body which can be doped and hand-rubbed to a high luster.

The wing and tail surfaces must obviously be accurately made and as well finished as you can possibly make them. You can afford to space your ribs 1-1/2 in., or closer, in the interests of an accurately preserved airfoil section and of better appearance. Tongue and box fitting is used by many builders but an equal number stick to the old rubber band method. There are many ways of improving on the latter to make for better appearance.

The outstanding success of the U. S. teams in this year's World Power and Rubber Championship has given a tremendous boost to international model competition. With top grade representation in A-2 competition as well, we can look forward to bigger and better World Championships in the future.

## ½ Wave

(*Continued from page* 16)

the notch in Former F. This arrangement is sufficiently secure if the tubing is sanded before cementing. Don't forget to file a notch in the rubber winder bushing.

The McCoy .049 Diesel is used in our latest ½ Wave and has proved to be the best engine for it. The Diesel's flexibility permits more latitude in adjusting. Our Diesel works swell with a Kaysun 7x4 prop. Plans show the Diesel installation.

Try to balance the ship close to the position shown on the plans, and check all surfaces for proper alinement. Also take a good long look at the radio gear.

The writer believes firmly in flying with radio ON during the first test hop. Free-flighting is postponement and a waste of time. The plane can bang up just as badly in free flight, and if you've flown radio before, you might prevent the pile-up. Check the ship for maladjustments by hand gliding before firing the engine.

Another failure of modelers is launching with insufficient power to keep the model airborne on the first flight.

The rudder movement shown on the drawings is for a starter. Adjust the throw accordingly and the ½ Wave will dive, spiral, loop and roll with any of them. Last, but not least, remember what we said before: the ½ Wave has excellent wind penetration, so don't let that small breeze keep you from flying.

*Editor's Note—The Lorenz two-tuber (MAN, February, 1953) is ideal for this airplane. Reports indicate that this receiver is most widely used throughout the country. Parts packages by several manufacturers.*

END


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that

does not heal

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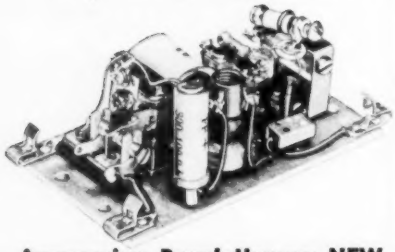

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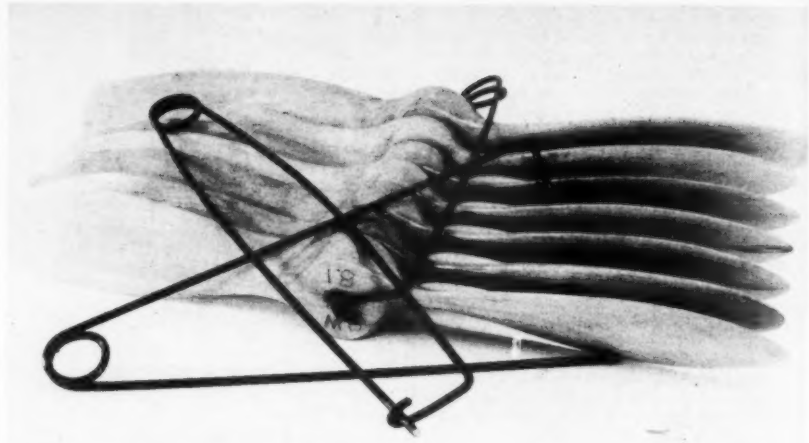

Made from old coat hangers, these big safety pins are wonderful for conveniently grouping props of various diameters, pitches. Try it if you have ever unexpectedly run out of props on the field.

# TRADE TRICKS—*Safety Pins for Props*

Here are holders for those extra props usually thrown loosely into the average modeler's tool box. They are easily and quickly formed from coat hanger wire to the shape shown in the photograph. The props are threaded on the pin of the holder which is then hooked to retain them.

Seven props are shown on one holder and two other holders are lying on the props. One is open to show the original shape and the other is hooked. When two or three props of one diameter or pitch are carried in reserve, together with props of other sizes, separate holders for the different sizes will be found a great convenience. The holders, of course, can be made in different sizes to hold any desired number of props.

—RAY RUSHER

## Team Racing Engines

(*Continued from page 22*)

lends itself easily to the required alterations. The writer can recommend the following modifications from first hand experience.

Let us first deal with the problem of torque. It is reasonably true to say that if the number of power strokes in a given time is reduced, then fuel consumption will also be reduced, but it also follows that the amount of energy produced in a given time will likewise decrease, with a consequent loss of power. However, if it is possible to increase the pressure acting on the piston during each power stroke, and the engine is capable of conveying this pressure to the crankshaft in the form of torque, then there will be an increase in available power for the given number of strokes. Taking it a stage farther, if the increased pressure can be derived from the same quantity of fuel, which it can, then we will get more power from the quantity, and accordingly will be able, with a suitable prop, to move a given load a greater distance with the same fuel consumption. Hence the value of high torque.

The McCoy .29 is a racing engine and consequently has fairly advanced port timing to permit the high rpm necessary to very high bhp. As a result, the still expanding exhaust gases are allowed to escape rather early in the cycle in order to make room for the incoming low pressure charge from the bypass ports. As we require increased torque at somewhat lower rpm, we can tolerate a slightly lower volumetric efficiency and may therefore retard the port timing. As a result, the exhaust port will open slightly later in the cycle and we shall extract a little more useful work from each power stroke.

The timing may be easily retarded in the McCoy .29 by simply lowering the location of the cyclinder liner in the block as shown in Fig. 1. As a result of experiment with three different engines, it was found that between .020 in. and .025 in. gave the desired results, and since the effective stroke is increased (that is the stroke of the piston above the point where all ports are closed), the compression ratio is also increased slightly. A further increase in compression ratio accrues from facing the top of the block to enable the head to clamp the liner-flange in position.

The result of raising compression, as explained earlier in this series, is increased maximum cyclinder pressure. The Mac is able, owing to ball bearings and high structural strength, to convert this pressure into torque, but suffers an rpm and bhp loss on nitro methane and nitro propane fuels owing to detonation as a result. However, suppose we accept this for the moment and use a prop of coarse pitch that holds the static rpm down to about 12,000. It will be found that this figure is appreciably higher than that obtained on the same prop before the modifications were carried out. You have, in fact, more power in the lower speed range, and with suitable props will therefore get more miles per gallon.

The execution of this alteration is not difficult, and a lathe not essential. However, it is necessary to make a simple boring bar that is a good slip fit in the bore of the block, thus providing a pilot. The cylinder liner must, of course, first be removed by heating the block above a gas flame or in the domestic oven, and withdrawing the liner with a wire hook.

The toolbit is first set in the boring bar as shown in Fig. 2 and the flange recess increased in depth by .020-.025 in. This may be checked with a steel rule, .015 in. being equivalent to 1/64 in. Finally, the toolbit is set so that the cyclinder head seating is faced off by the same amount, and the flange recess therefore restored to its original depth. This cut may be executed progressively by increasing the toolbit cutting radius in steps in order to reduce the cutting effort.

It is, of course, vital that the faces remain

at right angles to the axis of the bore, and piloting is the only sure way of guaranteeing that they do.

One undesirable result of lowering the liner is that the effective port area is reduced, and another is that the piston skirt uncovers a larger area of the exhaust ports at top dead center. The latter occurrence does not have any noticeable effect on carburetion, although it must inevitably reduce suction. The former snag may be offset by increasing the lateral dimension of the liner ports by carefully filing the port bars down to a width of .030-.025 in. Care must be taken to insure that this dimension is maintained on the inside edges. The outer edges may be chamfered slightly all round the ports to assist gas flow. The port areas will be slightly larger than stock as a result of this measure.

The piston crown should now be reworked to improve its efficiency, and a little careful filing in conjunction with Fig. 3 will make the exhaust ports open simultaneously. Only the edges of the baffle should be touched as the interior of the piston is cored out to conform with the external contours.

Since we propose operating at lower rpm, the stock rotary inlet timing will be too advanced for maximum efficiency with the result that blowback through the carburetor will occur with consequent wastage of valuable fuel. It is therefore advisable to reduce the angular dwell of the port opening after TDC from 44° to 30°.

There is no straightforward way of modifying the existing rotor and the simplest expedient is the construction of a new one. A glance at Fig. 4A will indicate how this can be done without too much trouble. If a piece of 3/16 in. duralumin sheet with a smooth flat surface is used and care taken not to damage it while filing, it will be found that a good valve seal can be obtained by lapping on a flat surface with metal polish. The balancing holes can be supplemented by smaller holes in the appropriate places until perfect static balance is achieved.

The preferred, though rather tedious, alternative is carefully to make and fit an aluminum plug that will block off a 14° segment of the stock rotor, and pin it in position as illustrated in Fig. 4B. This plug should not come in contact with the backplate face but should clear it by .033-.055 in. Again, small holes should be drilled 1/8 in. deep in the appropriate places to restore balance.

An obvious advantage of the above is that the electro-chromed stock rotor may be used in conjunction with the steel backplate facing, with less wear and friction than likely with the hand-made version.

A last refinement concerns carburetion. It is important that only fresh air go through the carb, and to this end, it is worth making a long intake which is bent at right angles to project slightly from the fuselage. This also facilitates choking and creates the opportunity to relocate the jet assembly in a position most conductive to efficient fuel feed. The jet should not be more than 1 1/2 in. from the backplate, or starting will become uncertain. A 1/4 in. bore x 3/8 in. outside dia. soft aluminum tube may be used and threaded 3/8-32 to fit the backplate. A 9/64 in. dia. hole drilled through the tube will take a McCoy .19 type spraybar assembly and give improved fuel suction to offset the suction loss occasioned by the liner modification. Volumetric efficiency will not be impaired, as more air than normal will be induced under the piston.

The final product is an engine which is somewhat detuned by speed model standards, but is capable of flying 20 per cent farther on similar fuel, and in the writer's models only dropped 5 mph in comparison with a stock engine, but stayed invariably right on the bit through the entire tank, which frequently meant an unaltered average speed and enabled the elimination of one, and occasionally two, pit stops in a 10 mile race.

The high compression ratio built into the engine calls for a little fuel tailoring, and detonation will occur on nitro propane fuels. However, the addition of 5 per cent of nitro benzine to the normal gasoline/nitro propane/SAE 50 mixture will usually cure it. If not, a .005 in. aluminum decompression gasket must be fitted under the head. The addition of a further amount of nitro benzine is inadvisable as it reduces the potential range per tank of fuel. Experiments should be carried out with compression and fuel for optimum performance along the lines suggested in an earlier article in this series, and checked in flight rather than on the bench. A medium heat long life plug should be used to reduce the risk of plug failure.

Finally, to get the greatest efficiency from your engine, the mechanical features should receive detailed attention and this aspect will be covered in a subsequent article dealing with speed tuning.

## The Kingfisher

(*Continued from page* 11)

bellcrank. We used a 2 in. nylon crank.

We used a commercial aluminum cowl for our ship, attached at four points, as shown on the drawings. If you can't obtain one locally, it is a simple matter to make up a balsa unit, using a compass to draw the round bulkheads on 1/4 sheet. We found this size cowl to be common, though. Finish up the planking and sanding now and cover the new structure with silk. Treat the whole assembly to enough fuelproof clear dope to leave a fine surface after light sanding.

We'll leave to you that "system" for obtaining a fine finish. We use the oft repeated advice of dope, rub, dope, rub, etc. The colors are: fuselage, landing gear struts, cowl —light grey; wings—all yellow; tail—light blue; fuselage band and cowl ring—red.

The rest is shown clearly on the drawing. Now add the wheels, canopies, engine and tank. We believe that flying preferences rest on personality: we like one thing, you like another. But this ship is really easy to handle.

## "Conrad"... Our Hero

(*Continued from page* 13)

are satisfied with the glide, light the wick, allow a couple of seconds for the thrust to develop, then launch smoothly on a level keel.

Aim for a shallow turn in either direction for best results, although you'll find that if you haven't enough turn, Conrad will roll off the top of a loop in masterly fashion. In the course of several dozen flights, our hero's features became somewhat battered, but the beauty of his all-sheet construction is that when a bit gets knocked off, you can stick it right back on in a matter of seconds!

END


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## Radio Control News

(*Continued from page* 31)

receiver is the phase shift network. Basically, this network accomplishes two things. First, it removes the quench voltage built up by the receiver which would otherwise accompany the detector signal output. Secondly, it provides a band pass for the frequencies between 300-3,000 cps and highly attenuates frequencies on either side. The quench frequency, of approximately 25,000 cps, is thus eliminated. The gain at 3,000 cps is approximately twice that at 300.

Howard Bonner and John Curry from the West Coast utilized this design in their two-channel audio equipment which was used at the '53 Nationals. The RF section was eliminated, thereby making a five tube unit for two channels. A detector, two audio stages and two relay stages employing a 1V5 tube and neomatic relay were used.

One particular advantage we see in the drone system is the elimination of modulation frequencies as high or higher than 100 per cent for other types of equipment. Also, there is no electro-mechanical component to become erratic in operation because of grime or dirt. There are no other moving parts outside of the relay armature. Incidentally, only one of the tones can be transmitted and picked up by the receiver at one time. Transmission of more than one tone will produce a beat note in the receiver which will be different from any of the aforementioned frequencies and operation of the relays will be impossible.

### NEW ITEMS

Babcock Radio Engineering Co., Van Nuys, Calif., has under development a multi-channel tone outfit. The receiver uses filters and eliminates the needs for a reed bank. Bonner is expected to produce special escapements for use with this (or other) multi-channel sets. Babcock also interested in 465.

A short visit recently with Frank Zaic showed that the RC modelers are in for some interesting innovations. Noticed especially a set of three wing and stabilizer kits. These sets will build 42, 50 and 60 in. wings which have a 6:1 aspect ratio and employ a modified Clark Y airfoil for excellent all-around performance. Since most RC models vary only in fuselage design, these wing/stab kits will prove a boon to the designer.

Also shown was a new line of excellent heavy duty wheels designed especially for RC work. The first dural hubbed wheels will reach the market in the popular 3-1/2 in. size. A special interior rubber valve allows the wheels to be re-inflated.

Did you ever wish for a small compact winder to take care of your escapement needs? A 1-1/2 in. diameter by 5/8 in. case houses 4-1/2:1 ratio gears and the long rubber hook allows operation in otherwise awkward quarters. No more bulky winders or makeshift gadgets; just use it and stick in your pocket. This winder and the above wheels and wing/stab kits can be had by writing to Model Aircraft Co., Box 333—Station D., New York 3, N. Y.

Neomatic, Inc., of 9010 Bellanca, Los Angeles 45, Calif., is famous for its sub-miniature of 5,000 and 7,250 ohms, as used by the model trade. The company now has a sub-miniature DPDT relay in practically the same space configuration and weight as the standard type. It measures approximately 3/4 x 1 x 1-1/16 in. and weighs slightly over 1/2 oz. This should be a welcome item, since various switching combinations are made possible by a DPDT relay.

It's revolting to think about your engine cutting out in a critical maneuver. The DeBolt Model Engineering Co. of Williamsville, N. Y., has come up with what is known as the *Positive Flow Fuel* tank. This 1-1/2 oz. tank has in internal swivel which assures that the fuel inlet follows the general level of the fuel at all times. A simple but unique tank which should find its way into quite a few RC models this year, it retails for $1.25.

### CLUB NEWS

Wm. Gilkey, W2RND, of Pitman, N. J., invites any and all radio fliers to gather at the Pitman Airport any Saturday afternoon or all day Sunday, weather permitting. An excellent chance for the boys to get in some good flying in an unrestricted area. Any more offers from around the country? Don't forget, a modeler just a short distance from you may not know of a good flying site and therefore you both miss some fun.

Mr. R. L. (Brownie) Brown of Ontario, Calif., advises us of something new and interesting in the line of radio control. It seems that RC boats are on their way up and unusual contests are now held in Riverside, Calif., almost every week-end. Fig. 2 shows a pattern that is run. As can be seen, this is primarily an obstacle course and a total of 400 points can be amassed by good helmanship. There are no restrictions of any kind on the boat or radio equipment except that the operator have the proper FCC permit. Four minutes are allotted for starting engines, etc., and the course must be run within six minutes after the boat is placed in the water. This pattern may not appear to be too difficult until you realize that the boat must be steered between obstacles 4, 3, and finally 2 ft. apart. Don't forget that choppy or disturbed water is just as bad for good maneuvers with a boat as rough air is for a plane.

Now that spring is approaching and clubs will again be actively flying, we are listing a few of the RC clubs.

Lexington Aeroknights
% Jim Marvin
1610 S. Limestone, Lexington, Ky.

Minnesota Hot Watts
% "Red" Costlow
1709 Lagoon, Minneapolis, Minn.

DC/RC Club
% Bill Nesbitt
1115 Chickasaw Dr., Silver Springs, Md.

Los Angeles Radio Controllers
% Patrick Regan, Jr.
13365 Garber St., Pacoima, Calif.

Detroit RC Club
% E. S. Kratzet
1112 Book Bldg., Detroit, Mich.

Waterloo Prop Twisters
% Kenneth Jackson
702-1/2 W. Mullan Ave., Waterloo, Ia.

Mr. R. Patrick Wheeler
% Land Survey Branch City Hall
Capetown, South Africa
(Builder of reed equipment and miniaturized Lorenz receiver.)

While not exactly club news, we have information from several club members around the country who have solved a perplexing problem or two on the Lorenz and Miller receivers we have published. When winding the coil, be sure the wire is wound *tightly* around the coil form. Loose fitting or sloppily wound wire will not give the same inductance the designer originally planned. A simple but effective cure for a lot of troubles.

END

Harold Keller, Aeronca C-2, Torp. 15, 27.255.

# THE "LIVE WIRE" "Cruiser"

DE BOLT MODEL ENGINEERING CO
WILLIAMSVILLE, N Y

**NEW!**

A fine new 100% Radio Controlled model, very realistic in appearance, exceptional in performance, high in quality.
*THE MODEL WHICH WILL SET THE PACE!*

The "Cruiser" has been developed to give you "big plane" looks and appearance, combined with the fine flying qualities of our Live Wire design. In the "Cruiser" you have the ultimate in R/C design, construction and utility giving a semi-scale model capable of contest performance under any conditions. The "Cruiser's" performance is exceptional with the simplest single channel radio, yet it accommodates the fabulous multi-channel systems with ease giving even finer performance with the additional controls!

## SPECIFICATIONS:

Wing Span: 65½"
Wing Area: 775 sq. inches
Wing loading: Min. 13 oz./sq. ft.; Max. 20 oz./ sq. ft.
Weight ready for flight: 4 to 6 lbs.
Bare model weight: 3 lbs.
Power: .19 to .23 engines
2 or 3 wheel landing gear as desired

### Kit Contents:

- ★ Full size working drawings
- ★ Complete instructions including radio installation
- ★ All necessary hardware
- ★ Dural gear
- ★ R/C Bellcrank and horn
- ★ Grade A/1 materials
- ★ Precision finished parts
- ★ Decals

**Complete Kit $14.95**

### Exclusive Feature

New, More Compact R/C Unit

- ★ Remove entire R/C gear in less than one minute!
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- ★ Changes can be easily made.
- ★ Approved by all leading radio manufacturers!

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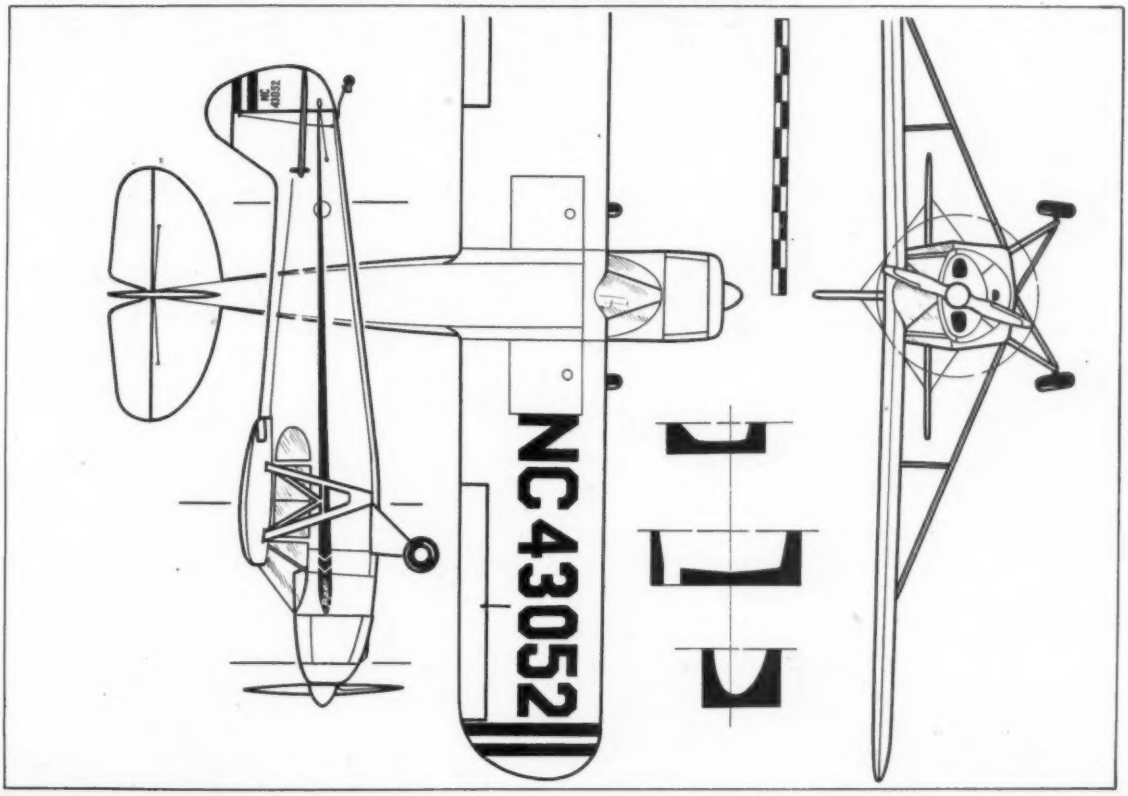


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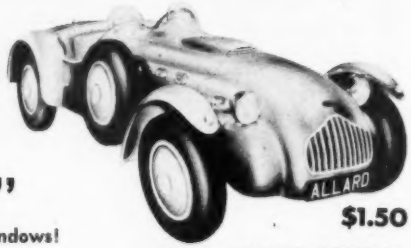


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English built, Cadillac powered, 130 mph

- JEWELRY CAST METAL BUMPERS, GRILL, LIGHTS, STEERING WHEELS!
- STAMPED METAL HUB CAPS! • RUBBER WHEELS!
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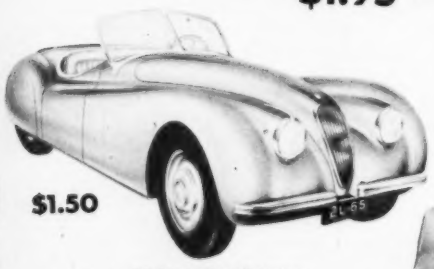

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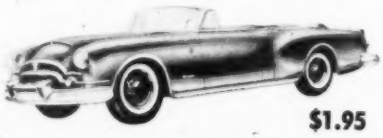
123.6 mph English Sports Car.



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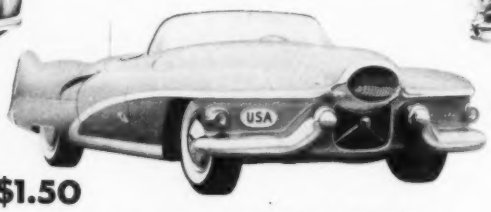


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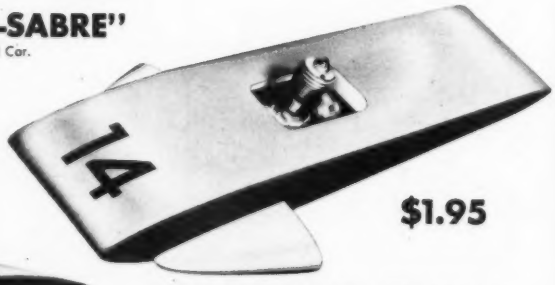


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- Pre-Fabricated Mahogany Veneer • Full Size Plans
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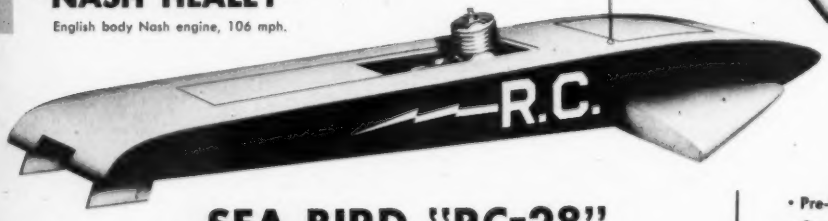


## SEA BIRD "RC-28"

### "A-B" Race Boat — Easy-to-Assemble

**For .09 to .35 Engines — 28" Length**

- Pre-Fabricated Mahogany Veneer Covering
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- Full Size Plans Including Radio Control Installation Details

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The Sea Bird "RC-28" was designed for use either with or without radio control. Simple to build, it enables the builder to race the boat the next day after he buys the kit! Construction is simple, along aerodynamic lines. No difficult bending or forming of parts. Without R.C. it can be used either free-running or on a tether line.

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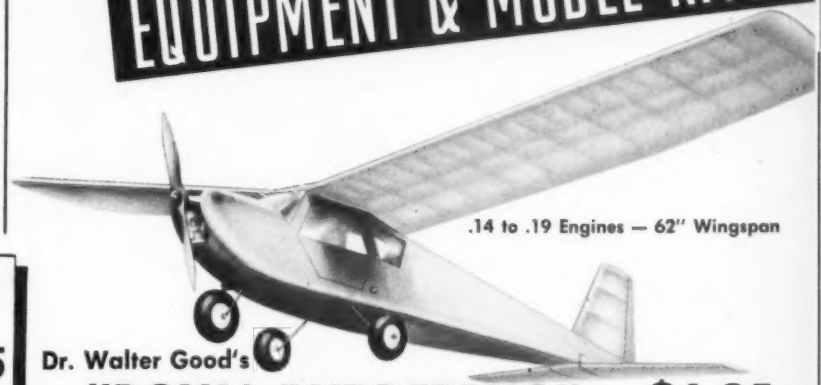
Combination Receiver-Transmitter Kit that sells for **$29.95**

Includes everything found in both DE-202K and DE-203K Kits. By buying them together it saves you **$3.95**



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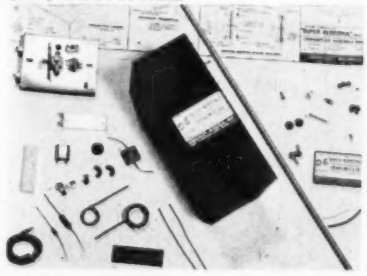
In Kit Form less tube **$19.95**

- Portable — Self contained — No separate antenna — No external Batteries!
- Operates on 27.2 mc. • Weighs 3.5 lbs.

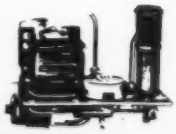
Kit includes all necessary parts (except tube and batteries): Precision Ground Crystal; Painted Metal Cabinet; Finished Sectional Antenna; stamped and formed chassis with all holes punched; all necessary components, resistors, condensers, coils and chokes; color coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included.



"Super Aerotrol" Dust Core Tuned

## RECEIVER

In Kit Form less tube **$13.95**



- NEW "locked-channel" dust-core tuning.
- Light in Weight, 2¾ oz. less batteries.
- Super-regenerator circuit, dependable.

Kit includes: Finished, tested sensitive relay; finished dust-core tuner; drilled bakelite base with condensers and eyelets attached; all electrical components, condensers, resistors, coils, chokes and potentiometer; all necessary contacts, and color-coded wiring. Can be assembled in less than two hours. Complete instructions are included.

**$3.95**

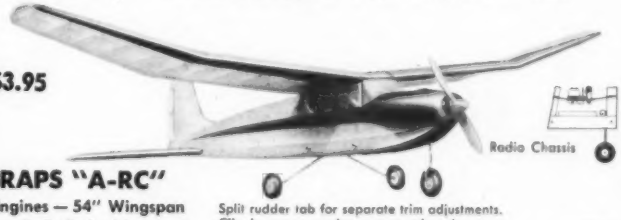
Variable Camber Wing for Radio Control Flying!

Slotted flaps may be depressed 10° for free-flight; depressed 25° for slow speed radio control flying; or raised 5° for high speed radio control flight.

Army Liaison YL-24

## "HELIOPLANE"

For .049 to .14 Engines 38¾" Wingspan—1" Scale



**$3.95**

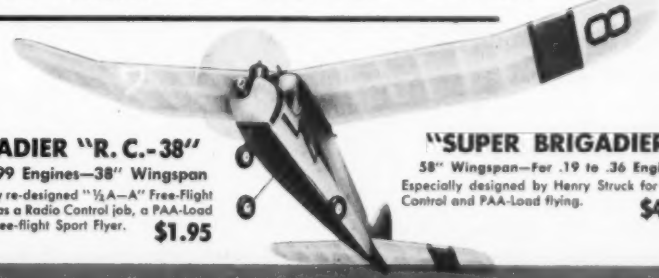
Radio Chassis

## BOOTSTRAPS "A-RC"

For .09 to .14 Engines — 54" Wingspan

(Empty weight 21 oz. — Radio, Equip., 14 oz. max.)

Split rudder tab for separate trim adjustments. Clip-in prone engine mount, tri-cycle gear.



## BRIGADIER "R. C.-38"

.035 to .099 Engines—38" Wingspan

This completely re-designed "½A—A" Free-Flight may be flown as a Radio Control job, a PAA-Load model, or a free-flight Sport Flyer. **$1.95**

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58" Wingspan—For .19 to .36 Engines

Especially designed by Henry Struck for Radio Control and PAA-Load flying. **$4.95**

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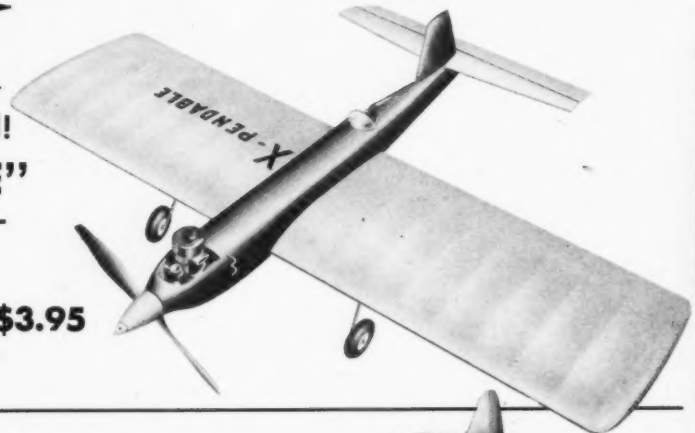


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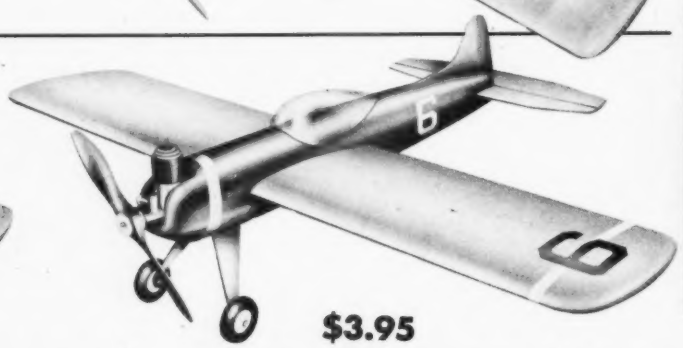

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